Volume 14, No. 6

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Hawaii and Soil Conservation

Multiple Purpose Waters

Riverbank Stabilization

Economics and Hydrology

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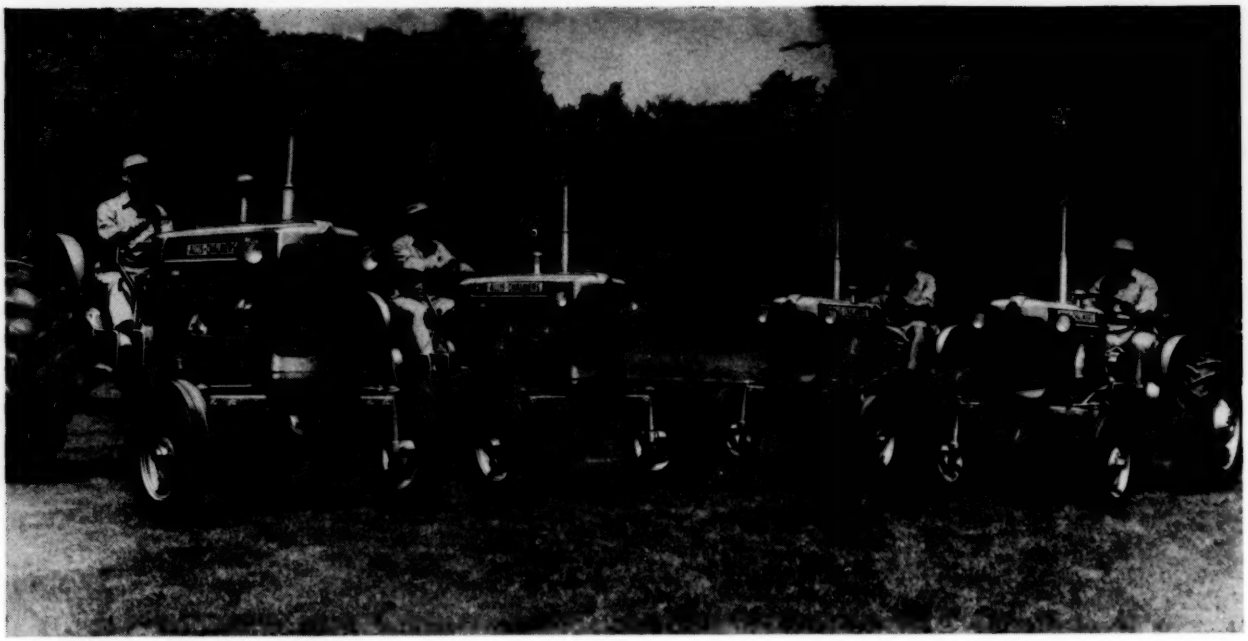

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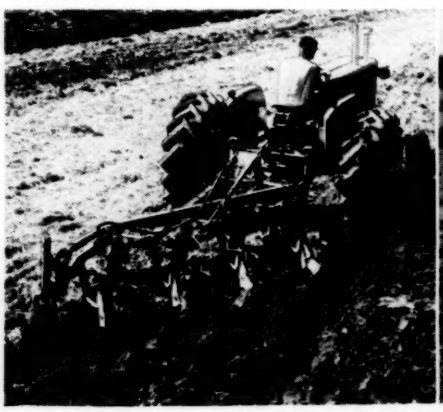

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TO ADVANCE THE SCIENCE AND ART OF GOOD LAND USE

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COVER: Soil judging and land appreciation is now taught to thousands of rural young people and adults through schools, colleges, universities, camps and special groups. There are also competitions on a local, state and regional basis that wind up in a national annual contest. This is all an excellent start. Soil judging and land appreciation will continue to expand until it brings in urban as well as rural participants. However you look at it, land appreciation is everybody's business.

DOUGLAS E. WADE, *Editor*
FELIX SUMMERS, *Contributing Artist*

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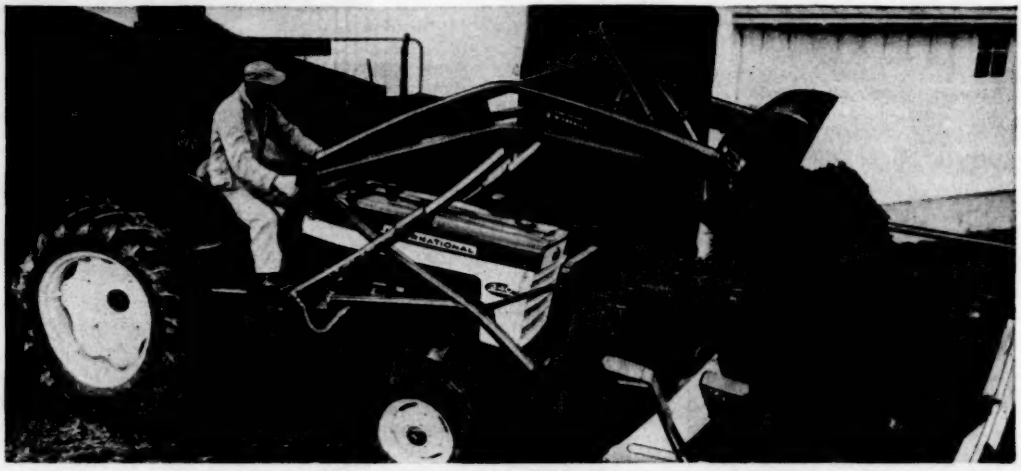

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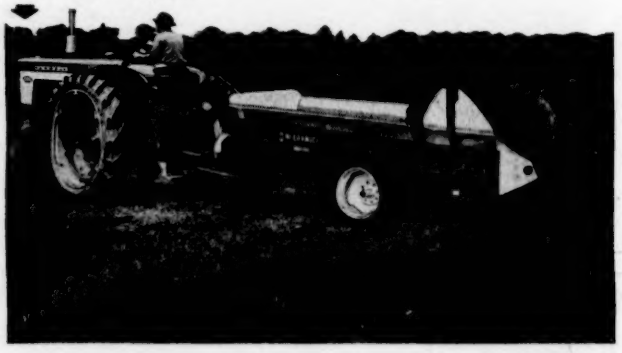

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Hawaii Sugar Land Conservation Experiences

CARL L. SUNDQUIST

TORRENTIAL RAINS falling on bare freshly harvested sugar cane lands no longer scar many of the fields on C. Brewer and Company, Ltd. lands, or flood townsites or cost the owners large sums of money annually to repair damages. Boyd McNaughton, president of C. Brewer and Company, Ltd., sums it up this way, "Of the ten plantations associated with our company, crop damage and soil and water troubles from last year's rains varied from plantation to plantation with the degree of conservation applied. Extensive losses in soil and considerable damages were reported by plantations not fully in the conservation program. Losses were much lighter on plantations that were well along in applying needed conservation measures."

Many areas of Hawaii are subjected to pounding rains of as much as 24 inches in 24 hours and intensities up to 4 to 6 inches for a single hour. Prior to the establishment of soil and water conservation practices Brewer's sloping unprotected fields were ripped and torn by the accumulated large volumes of water. Soil and crops were washed away every time one of these heavy rains appeared. Production could stay high only as long as soil remained on the fields. Crop losses and repairs were eating heavily into profits and capital investments. Something had to be done.

About five years ago C. Brewer and Company, Ltd., started a soil and water conservation program on two of their subsidiary plantations. They were the first Hawaiian big-cane planters to try an all-out soil and water conservation program. The plantations, Hawaiian Agricultural Company at Pahala, farm 10,000 acres of sugar land, and Hutchinson Sugar Company at Naalehu, is a 5,000-acre plantation. Both are located on the east side of the island of Hawaii.

With rising costs of production, sugar farming started toward mechanization about World War II. The change from hand work to highly mechanized operations brought on new soil and water problems. For years cane had been cut by hand, manually carried to flume lines and transported by water to the factory. A heavy layer of cane tops and leaves was left on the field to protect the soil.

Sugar cane for decades in Hawaii was grown as a perennial crop. Fields were neither plowed nor tilled until a more favorable producing strain of cane was found. As many as four to five crops were taken from one planting before the land was re-tilled and re-planted. Crop maturity at this location varies by elevation from 18 months to 36 months, indicating a span of 6 to 15 years before replanting.

Then came mechanization and changes. Harvesting operations included dozer raking of cane into windrows, crane loading into tracklayer infield cane haulers, unloading at roadside stations, and finally crane re-loading into 30-ton trucks for transporting to the factory. This rough field treatment tore the soil loose and damaged or destroyed cane plants. Replanting was necessary following each harvest on about three-fourths of the production area. Field traffic by heavy equipment caused extensive compaction of the soils. Cane crop residues, removed through raking, grubbing, and tilling, exposed the land to serious erosion damage from storms. Near one-half inch of soil per acre per harvest was picked up by the cranes and trucked to the factory.

Erosion losses ran as high as two and one-half inches of soil per acre per crop cycle. Run-off from equipment-compacted bare soils was three to thirty times greater than on hand-harvested trash-blanket-protected lands.

Background Information Gathered

In May 1953, James S. Beatty, manager of Hutchinson Sugar Company, and John Ramsey, then manager of the Hawaiian Agricultural Company, asked the Kau Soil Conservation District directors for technical assistance to cope with sugar land soil and water problems.

Representatives of the Soil Conservation Service, Victor Thalmann, a private consultant, and company management representatives inspected both plantations and worked out ways of combating some of the problems.

Each plantation organized a company soil conservation committee, including representatives of management, cultivation, harvesting, engineering, and research. The committee met regularly with Soil Conservation Service technicians.

The next step was to gather information which came from previous research data, local records, field observations, soil surveys and trials. Some of the best information came from experiences of people who had been farming the land and producing sugar for years.

Carl L. Sundquist is Range Conservationist, Soil Conservation Service, Honolulu, Hawaii. He was formerly Work Unit Conservationist, Naalehu, Hawaii.

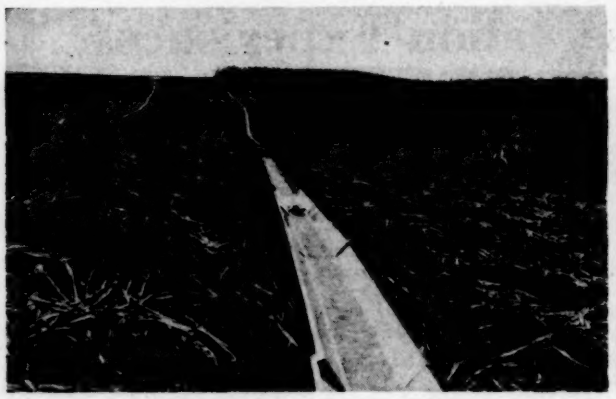


Figure 1. Hand harvesting cane. Long up and down fields were geared to water fluming the cane to the sugar factory on the coast. Tops and leaves left on the land provided much soil protection and aided in water absorption.

Figure 2. A mechanically harvested field. Little surface material is left after loading by crane and the soil is compacted by heavy equipment. Lack of cover leads to soil and water losses.

Weather Bureau precipitation records from selected stations a few miles apart on Hawaiian Agricultural Company's lands indicate the diverse conditions found in short distances (Table 1).

Rainfall records, showing intensities of 4 inches per hour, are frequent enough to warrant using that figure in design computations. Run-off has been measured as high as 9.8 inches per hour from a 2.7 square mile watershed. Two inches per hour run-off is considered reasonable in short term design work.

Ratings of run-off and erosion were made of various land preparation phases, physical installations, cultural practices and stages of cane growth. Hazards were rated from 1 to 9 (Table 2); 9 being the highest hazard, 1 the least.

TABLE 1

Monthly Distribution of Precipitation at Three Locations on Hawaiian Agricultural Company Lands

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Pahala—Elev. 865'													
66-yr. mean	7.33	5.30	4.93	4.15	2.23	1.37	1.38	2.52	2.94	4.10	4.12	5.68	46.05
1957	12.38	1.98	1.00	3.15	3.18	1.42	.55	5.44	3.35	4.08	2.78	7.12	46.43
Kaala iki—Elev. 1350'													
19-yr. mean	9.33	7.61	7.09	4.35	3.64	3.35	2.88	3.80	4.82	5.42	6.23	6.27	64.79
1957	14.54	3.35	2.31	4.26	5.42	3.15	1.87	7.64	6.90	7.19	7.03	6.19	69.85
Kapapala—Elev. 2100'													
71-yr. mean	9.33	6.39	6.78	6.49	3.82	2.18	2.29	3.67	4.52	5.57	5.29	5.75	62.08
1957	14.60	5.00	1.54	6.56	6.12	3.06	.94	13.75	6.06	6.28	3.97	8.93	76.81

Figure 3. A freshly-planted field after an intense rain. There was much splash erosion and rilling in the furrows.

Figure 4. Runoff from a steep road cuts into the side ditch creating a deep gully and hazard.

Figure 5. Typical of new conservation field layouts is this contoured ratoon field and road-ditch.

TABLE 2
Relative Run-Off and Erosion Hazard Ratings for High Intensity Rains

Land and Crop Condition	*Runoff Hazard*	*Erosion Hazard*
Roads	9	—
Freshly harvested untilled land	8	4
Early aged uncultivated ratooned cane[1]	7	4
Early aged cultivated ratooned cane	6	5[2]
Planted cane 2 months old to close-in	5	5[2]
Freshly tilled or planted land	4	6
Closed-in cane land, both planted and ratooned	3	3
Seed cane fields to rank growth stage	2	2
Rank cane growth	1	1

[1] Ratooned cane sprouts from the root crown of a previously harvested plant.
[2] On Reddish Brown Prairie and Brown Forest soils, rilling occurred in furrows or cultivation marks over 3% in slope; on Humic Latosols over 5%. Very little rilling was noted on Hydrol Humic Latosols to 10% slopes.

Pattern of expected rains resulting in erosion on open fields as related to soil families was developed (Table 3).

TABLE 3
Rain as Related to Soil Losses

Soil Family	*Number of expected rains per year that will contribute to losses through: Sheet Erosion*	*Sheet & Rill Erosion*	*Sheet, Rill & Gully Erosion*
Reddish Brown Prairie	5	4	2+
Brown Forest	6	3	2
Humic Latosol	8	3	1
Hydrol Humic Latosol	10	2	1—

January, February and March is the period having the highest number of damaging rains; November, December and April next; May through October, the lowest number.

Relative erosion and run-off ratings for freshly mechanically-harvested open fields were developed:

Soil Family	*Erosion Resistance*	*Run-off Rating*
Reddish Brown Prairie	Very low	Low
Brown Forest	Low	Low
Humic Latosol	Medium	Medium
Hydrol Humic Latosol	High	High

Some Recommendations

Final committee recommendations included:

1. Surface protection is needed for the period from harvest until cane close-in. A full canopy of leaves and stalks, or close-in, can be achieved in three to six months depending on the season of year and elevation of the field.
2. Place a high priority of work to fields on high erosion hazard soils.
3. Harvest steep slopes, those 40 per cent and over, by hand or retire them from production.
4. Ratoon cane as long as possible in order to reduce the plowing and cultivation operations and provide the shortest possible close-in period.
5. Let harvest residues remain on the surface and reduce the number of cultivations on ratooned fields to a minimum.
6. Re-design fields from up and down hill flume fields to strips across the slope. This makes possible a strip-cropping system of different aged cane which protects freshly harvested areas with a band of cane above it. It's best to divide steeply sloping lands into strips 500 feet wide or less; flatter land may have strips up to 1000 feet wide.
7. Design and install interception ditches above cane lands plus a system of infield diversions. Plan infield ditches to handle run-off from 25 to 40-acre watersheds with a graded road system as a part of the system. Use vegetative linings or protective structures at outlet points.
8. Schedule harvesting of critical fields for less hazardous months. (Months with high rainfall intensities and high total rainfall to be avoided for harvesting.)

Figure 6. Inter-row cover, such as winter wheat, provides needed protection following field harvest. Research is underway to provide a way of returning cane residues to the land.

Figure 7. Cane lands are subjected to torrential rains. Here a system of contoured infield ditches leads water safely into major gulches and lava tubes which are nature's storm sewers.

9. Conduct operations in fields as near to the contour as practicable.

A plan of action was set up. A master layout with the desired field reorganization and disposal system was developed. An aerial topographic map was used as a base for this purpose. Soil Conservation Service engineers provided design criteria for the water disposal system. Technicians and committee personnel plotted the system to meet the requirements of each contributing watershed. Future field arrangements were planned to conform with the disposal system and a projected strip cropping pattern.

Action Taken

New work began to show up on the land by October 1954. Nearly all of the 86 miles of ditches planned were installed and six thousand acres of stripcropping were in by July 1958. A seasonal harvesting schedule that avoids open fields during the high hazard months, and contour farming are standard plantation practices. Total field reorganization will be completed by 1970.

Local trials are underway to test sod-forming grasses for waterways, roadside ditches and ditch outlets. Kikuyu grass *(Pennisetum clandestinum)*, a giant strain of Bermuda grass *(Cynadon dactylon)* and Bahia grass *(Paspalum notatum)* are considered the best possibilities. Waterways up to 8 per cent grade have held for three years with Kikuyu. It can be established in six months.

Methods of leaving vegetative material in the fields or returning residues to the fields are being checked. Fast growing inter-cane row cover crops are being tried. It is hoped that one compatible with cane can be found to provide rain-splash protection until such time as the cane residues can economically be returned to or left on the land.

The Hawaiian Sugar Planters' Association Experiment Station is developing better infield equipment. A pilot cane cutter and field cleaner machine now in use leaves trash on the surface for soil protection. It also damages fewer cane plants leaving them to ratoon and provide quicker field cover.

Infield ditches are reducing rilling and gullying on "open" fields.

Diversion ditches are used as guides for contour farming. Road-ditch combinations are used as field roads and as field boundaries.

All ditches on erosion resistant soils have functioned well on land slopes less than 12 per cent with ordinary maintenance. Performance has been satisfactory on slopes of 12 to 20 per cent, but additional maintenance, and patrolling during storms is necessary to keep the ditches clear of debris and silt. Ditches on land with over 20 per cent slopes have been unsatisfactory due to high velocity water entering from rills and natural drainageways, silt and debris collection, and failure to maintain proper ditch grades and cross sections on such steep slopes.

Water diversion has proven the most satisfactory on Hydrol Humic and Humic Latosols and to lesser extent on Reddish Prairie and Brown Forest soils. This relates directly with the erosion resistance of the soils and variations in silt load by intensity and duration of rains.

Evaluations have been made of strip cropping. Buffer strips of closed-in or older cane help to hold water and soil on the field, particularly on steeper land where ditching is hazardous or inadvisable. Silt laden water from low erosion resistant soils flowing over a bare harvested strip becomes clear water in a short distance after penetrating a near mature cane strip. Water, except that from high-intensity long duration rains, dissipates within the growing strip.

Contour farming has proven itself. Plant furrows, cane lines, and the ratoon cultivator marks on or near the contour keep soil and water in place when rains are of low intensity or during short duration high-intensity rains. Contouring loses its effectiveness under high-intensity long duration storms.

"Even though complete conversion to strip cropping will take many years," stated Paul R. Tate, present manager of the Hawaiian Agricultural Company, "we feel that this step is a must in the proper application of a sound soil erosion control program at Hawaiian Agricultural Company."

"All conservation measures are not only important in that they save a great deal of unnecessary expense but, probably more important, they give us a means of protecting and saving our soil. Several storms of high-intensity rainfall to date have successfully proven the merit of this approach."

Other plantations are now making rapid strides following along the guide lines set by these two Kau companies.

Summary

Mechanization, torrential rains and varied soils have set up conditions requiring intensive erosion and water control measures on Hawaii's sugar land.

Large industrial type sugar plantations, like other farms across the land, are coping with their soil and water problems through Soil Conservation District action.

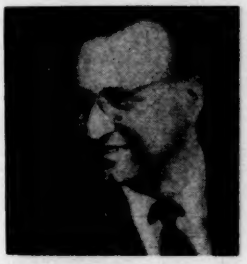
After gathering local land data and determining needs of the land, a workable conservation plan was developed by plantation personnel, assisted by SCS technicians.

Strip cropping, contour farming and a water disposal plan are being applied.

An operational method to provide surface protection has not been determined. The practices on the land have been very helpful in controlling soil and water losses. ■

Multiple Purpose Waters

RICHARD H. STROUD



This paper is based on remarks by Richard H. Stroud, Executive Vice-President, Sport Fishing Institute, Bond Building, Washington 5, D. C., at annual meeting of the New Jersey Chapter of the Soil Conservation Society of America held during the 44th Annual State Agricultural Convention, Trenton, New Jersey, January 28, 1959.

A DECADE AGO it was difficult to speak with much assurance on *technical and economic aspects of outdoor recreational development at multiple-purpose reservoirs and farm ponds*. Although today a great many difficult problems still confront water and recreation resource managers, complete frustration is no longer inevitable or fashionable: At least three significant new conservation developments have helped.

Among these developments are: (1) improved understanding, through research, of recreational fishery resources management in artificial impoundments; (2) development of measurements of the economic value of outdoor recreation to business; and (3) growing acceptance of recreation in the multiple-use concept in water planning.

Dividends From Research

In the late 1930's, the Tennessee Valley Authority challenged accepted fishery doctrine. It employed a team of fishery biologists to find out why sport fishing suddenly "went to pot" in reservoirs a few years following impoundment.

At the time it was generally believed by laymen and biologists alike that reservoirs were extremely unproductive. This belief was based on experience with other reservoirs, notably the 59,500-acre Lake-of-the-Ozarks in Missouri. Absence of aquatic vegetation due to unstable water levels was one bit of "evidence" offered (20). Also, fishing was poor, a condition believed to result from too rapid a harvest by anglers of the supposedly "poor crops" of fish then universally associated with scarcity of vegetation.

Nearly a decade of "round-the-clock" study of biological, chemical, and physical aspects of TVA reservoirs, principally 30,000-acre Norris Reservoir, Tennessee, followed. The findings were revolutionary in their implications for fish conservation (10). Yes, fishing "went to pot" after a couple of weeks of early summer angling. But, it was *not* because the available crop was depleted. The decline in angling success coincided with the hatching of the year's crop of young fish. At that time, a condition of food-scarcity for adult fish was transformed dramatically into one of natural food-abundance. As quickly, the lures of anglers lost much of their appeal.

The reservoirs were found to stratify thermally much like large natural lakes. In addition, discharge for electrical generation from low levels causes a thickening of the thermal layers as the months pass by. The fish respond to this change in environment by "going deep" in order to maintain specific temperature "preference" relationships. Fish become seasonally scarce in shallow water but remain abundant in the reservoir.

The TVA research revised many alleged "facts." It showed that the reservoirs produce substantial quantities of desirable sport fish but that anglers take only a small part of the crop. It was also learned that most of the fish grow rapidly and die early natural deaths, and that greatly increased fishing could be safely supported if spring fishing were permitted. It showed, too, that an annual cycle of water level fluctuation is not necessarily harmful to sport fishing: Indeed, some possible benefits in some circumstances were discovered (13)!

These were important findings. When applied in the form of year-round fishing, principally through elimination of the closed season in late winter and spring, and with liberalized bag limits and size limits, the harvest of sport fish about doubled (9). Proof of the pudding is the record of good fishing at a high level of sustained yield during the 15 years since liberalized fishing was initiated

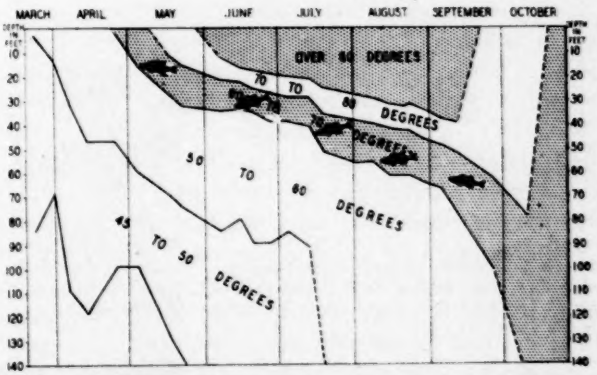


Figure 1. Water temperatures (isotherms °F) monthly in 1943 at Norris Reservoir (9). Fish silhouettes indicate temperature-correlated depth distribution of saugers. The top line on graph represents surface, although the reservoir level was lowered by 30 feet between early summer and fall due to discharge of bottom water. This caused a thickening of the thermal layers and corresponding movement by game fishes (bass, walleyes, crappies) to deeper water, shown here only for saugers.

Figure 2. Some nice bass and bluegills from an intensively managed impoundment. Such success can be expected in many waters only where research findings are carefully applied.

in 1944 (6). At the same time, too, fishing pressure (apparently total harvest as well) may have doubled again without measurable effect on the quality of fishing.

Critical engineering factor. At least one engineering factor appeared to be highly significant. When TVA dams were constructed, the penstock openings were located at relatively great depth—not far above the river bed. TVA biologists concluded that *this was the vitally important difference* from the many early reservoirs of ill-repute. In the 148-foot-high Bagnell Dam (Lake-of-the-Ozarks), for example, nearly two-thirds of the effective height of the dam lies below the upstream openings of the penstocks, through which the water below spillway level is discharged. In the 265-foot-high Norris Dam, by contrast, only two-fifths of the effective dam height lies below these normal discharge openings.

At Norris, therefore, in contrast to many older reservoirs, there normally is a discharge of deep, cold, silt-laden water strata (first appearing as a definable inflowing density current somewhere in the thermocline) often well in advance of dangerous exhaustion of dissolved oxygen (resulting from decomposition of the organic load). At Lake-of-the-Ozarks behind Bagnell Dam, there exists a huge "stagnation pool" about 100 feet in maximum depth due to the lack of water discharge from below the level of the penstock openings. This fact, in turn, has permitted the accumulation of much oxygen-consuming organic material, and resulting lack of oxygen effectively bars fish life from these deeper waters. Fortunately, an isolated oxygen-rich density current has been discovered flowing from some large springs along the bottom of one arm of the reservoir, and a vigorous though limited sport fishery has been developed in that section (3).

Watershed management beneficial. Another fortuitous development was the reforestation and soil erosion control program in the Norris watershed. Early in its impoundment history, Norris Reservoir was given a useful life of perhaps 150 years before accumulated silt deposits would render it obsolete. Recently, following extensive rehabilitation of the watershed, this estimate has been increased several-fold (to about 800 years according to verbal communication from TVA). The silt load has diminished decidedly.

This is significant for recreational fishing and associated boating. Several years ago, the Sport Fishing Institute, aided by funds from Outboard Boating Club of America, sponsored a major study of some effects of suspended silt in impoundments. Studies were conducted by

Figure 3. Schools of largemouth bass are abundant for fishing where waters are kept clear and fish populations are kept in balance.

fishery scientists at the Oklahoma Fishery Laboratory (Norman, Oklahoma) on two large reservoirs, a number of selected farm ponds and several experimental ponds.

Startling indirect effects of varying degrees of "muddiness" were demonstrated on reproduction, survival, and growth of several species of sport fish; on production of plankton food organisms; and on the quality of fishing. In brief, silt-laden waters proved to be decidedly harmful to maintenance of sport fishing (4).

Farm pond studies. Concurrently with TVA fishery studies, a team of scientists began to study farm-pond management principles and methods at Alabama Polytechnic Institute, Auburn. They employed experimental techniques, using small ponds as test plots, replicating the experiments many times. Results have been impressive for the development of basic principles and new insights into the dynamics of fish populations (17). The work has demonstrated beyond doubt that fish populations in small ponds at least can be managed deliberately to produce good fishing at an artificially-sustained high level of continuing yield.

Confirmation is contained in practical application of Alabama farm-pond management practices on a large scale by the Alabama Department of Conservation. Sixteen lakes containing a total of 1,219 acres have been under active management for recreational warm-water fishing for one to nine years.

The watersheds above these ponds are in most cases in private control. Soil erosion is controlled and insoak encouraged. Prior to construction all fish within each watershed are destroyed with fish toxicants to postpone contamination by undesirable species. Management activities, after construction and initial stocking, include regular fertilization, weed control, fish population manipulation, controlled water-level fluctuation, and occasional renovation and restocking, as indicated from periodical pond analyses.

Fishing is good and holds up well throughout the year. For a nine-year period through 1958, total annual recreational fishing trips (angler-days) have averaged over 15[illegible] per acre of water. The average annual harvest has exceeded 150 pounds of fish per acre (5). In other regions, with different climate, geology and fauna, considerable research is still needed before this can be matched consistently. It seems the *principles* (if not some of the details) discovered in Alabama may be widely applicable.

Outdoor Recreation Benefits

A second major development is the measurement of economic values for outdoor recreation. Conservationists are now able to approach the conference table with up-to-date "economic measurements" in strong defense of their interests among competing interest groups. The recent (1955) national survey of fishing and hunting, sponsored by the U. S. Fish and Wildlife Service, was most revealing and helpful (1).

Briefly, the survey revealed that 21 million Americans 12 years or older fished in 1955. They spent over 397 million man-days at their favorite means of outdoor recreation. They also spent over $1.9 billion for the goods and services required "out fishing." This averages out to $92 per angler or about $4.82 per angler-day. Salt water anglers spent $8.34 per day. Fresh-water anglers spent about $4.20 per day. Nearly 8 *billion* miles of automobile travel were incurred. Anglers averaged more than 860 car-miles to go fishing throughout the year, or 45 miles per day.

There were also 11.7 million hunters 12 years or older. They derived over 169 million man-days of recreation from their sport and spent some $937 million in the process. Average daily purchase for hunters needs came to about $5.52. Hunters drove over 6 billion miles, which figures to some 515 per hunter, or about 35 miles per day.

Business values generated by sport fishing. It is possible from the foregoing statistics to calculate a minimum figure for the potential value to a community or a region of an acre of water used for fishing (and hunting) in terms of business activity it may generate. It appears that intensively managed waters are potentially capable of supporting upwards of 100 or more fishing trips (angler-days) annually per acre. Full realization of this potential may be years in the future on most waters in many sections of the country. I believe, however, that half this figure of 100 angler-days annually per acre represents a currently attainable goal on many waters. Clear Lake, Iowa, for example, is a naturally productive 3,643-acre lake, essentially unmanaged, that now supports nearly 50 fishing trips annually per acre (7).

Generally, intensively fished waters seem to be located close to large population centers—usually within 50 miles. Anglers from these areas, fishing locally, require fewer goods and services than those on weekend or vacation trips. I estimate they spend about 25 per cent less—about $3.10 per day—when fishing locally.

On this basis, each acre of fishing water managed intensively for warm-water fish has an ultimate potential to generate some $310 of local business activity annually (100 angler-days per acre). At a 4 per cent interest rate (25-year period) each acre therefore has an equivalent capitalized value of $7,750 to the local business community. At the outset economic values actually generated may be less—perhaps half (50 angler-days per acre)—as fishing use may not reach maximum immediately.

These estimates compare very favorably with the economic feasibility pattern that has been firmly established for golf courses throughout the country. Golf courses accommodate similar use levels, experiencing about 125 golfer-days (rounds) per acre of available courses (5,550

courses comprising 529,000 acres of land). Each acre of golf course constructed has required a capital investment averaging about $2,470 (16).

Such values have been criticized with some justification as being measures of *secondary* rather than *primary* economic benefits. That is, critics say, if anglers could not or did not spend their money on fishing, they'd spend it in pursuit of other activities, perhaps golf as an example. Critics contend that there is no new economic benefit created by virtue of the intrinsic value of that particular activity, be it fishing, hunting, boating, or something else.

Abstract arguments of this sort miss the point, in my opinion. One cannot easily put aside the fact that over 25 million Americans of all ages *deliberately choose to fish* regularly for sport, as a matter of conscious preference. In doing so, they have contributed to the development of a multi-billion dollar sport fishing industry to meet their demands for a variety of specialized goods and services. If we deny that this is important, we might as logically, I believe, argue that the auto industry makes only an indirect contribution to the nation's economy and is unimportant——would Detroit accept that!

Computing dollar values of recreational enjoyment. Past difficulties in developing measures of primary benfits from recreation have resulted in the practical exclusion of recreation from benefit-cost computations of water developments. A satisfactory measure of *primary recreation benefits* has been badly needed. An interesting new approach to the problem was proposed in California in connection with the widely publicized Upper Feather River development. In this instance $2.00 per visitor-day of primary recreation benefit was computed (18).

According to this study, benefits from reservoir projects are separated into primary and secondary benefits. As explained, "An example of primary benefits are net benefits accruing to farmers from irrigation water supplied by reservoir projects." Secondary benefits are said to include those benefits accruing to the business community due to increased expenditures by the farmers receiving the primary benefits. After analysis of various possible methods and values, it was concluded in this study that computations based on costs of travel alone (using a fixed cost per mile of travel) offer the least objectionable method for measuring the free recreational value that represents primary benefits.

Fort Gibson Reservoir (19,000 acres), Oklahoma, supported 31 fishing trips per acre in 1956. Tulsa, about 40 miles distant with nearly 200,000 population, is the chief source of recreational fishing users. The calculated free recreational value (*primary benefit*) for 1956 to Tulsans of sport fishing at Fort Gibson, applying the formula employed by Trice and Wood (18), would have amounted to $1.80 per visitor-day—equivalent to $55.80 per acre—if the method is a valid approach. At an interest rate of 4 per cent, then, each acre of water would have a *primary capital value* because of sport fishing amounting to not less than $1,395!

Recreation Factors in Water Planning

The chief value of such figures is to place outdoor recreation in a more favorable and measurable perspective in water development planning. Among the recreational needs that must be given immediate attention are adequate facilities for public access to water, including roads, parking and turning space, boat launching ramps, sanitary facilities, and in many cases, picnic and camp grounds as well.

Access survey. Last year, the Sport Fishing Institute undertook a national survey of access development on public waters by state conservation or fish and game agencies (14). Briefly, it was found that the state conservation agencies have thus far provided one access area per 300 acres of fishing water affected. At the same time it was determined that probably *less than one per cent of needs have been met* to date.

It is well established that fishing represents the chief use of boating equipment (2). Most states have equipped access areas with boat launching ramps and associated facilities. The ratio of one access site per 300 acres of water probably represents a minimum. In most cases, lands acquired for parking, trailer turn-around, and associated facilities have become decidedly overcrowded in very short order.

Michigan, for example, with the most extensive program of this sort, especially on lakes, has now acquired over 700 public access sites and has developed most of them. On lakes, the sites, with no provision for camping, average 5 acres in area with 436 feet of lake frontage per site. Where camping is involved, the sites average 56 acres with a water frontage of 1,040 feet per site.

The Michigan sites are heavily used by transient anglers equipped with trailer-drawn outboard boats. Despite great foresight displayed by initiating the program over two decades ago, the Michigan Conservation Department could not anticipate the full extent of needs. The individual access areas are now badly congested because of inadequate area per site for vehicular parking and turnarounds. About double the available space appears needed per site, as well as many more access areas on many more waters.

These data, taking into account probable future needs to meet anticipated growth in demand for water-borne outdoor recreation, suggested a formula for access acquisition. The Sport Fishing Institute recommends, in the absence of camping, that *one access site comprising at*

least 10 acres of land should be acquired for each 300 acres of lake or reservoir water area to be serviced (15). If camping is to be permitted, at least 100 acres of land should probably be acquired per site.

Recreational use of drinking water. In many areas of the country, the high value to communities or regions of multiple use of water-supplies for recreation, as well as for drinking water, is fully appreciated by water-supplying agencies (8). In this regard, the California State Director of Public Health has stated (in a letter dated July 1, 1955, to the California State Director of Fish and Game), that "there is not only a public interest but a ***public health*** interest in wholesome outdoor recreation, as well as in the supply of safe and potable water for domestic purposes." (Emphasis added.)

Full utilization of known principles of fish and game management and development of access, sanitary facilities, and recreational areas is practiced by a number of progressive water departments. Many municipalities such as Boston, New York, New Brunswick (N. J.), Columbus, Tulsa, San Diego—to name only a few from East to West—have adopted the multiple-use approach (19). Some go so far as to employ professional conservationists on water department staffs to manage the waters for maximum recreational development.

An outstanding example is that of San Diego, where full recreational use has occurred since 1931 (12). The city's seven reservoirs, with some 4,000 acres open to use, supported 118,600 individual fishing and hunting trips (30 per acre) in fiscal year 1955. Daily use fees of $1 per person over 16 years of age are charged. Appropriate sanitary facilities are provided at intervals of 1,000 to 2,000 feet around the perimeters of the lake. A supervising recreation specialist is employed for the planning, inspection, and liaison work with the different agencies involved.

The water department considers water recreation to be one of the important multiple uses of a municipal water supply. But it has never forgotten its prime purpose—that of supplying pure water. Treatment plants have been necessary because of turbidity, taste, and other factors not related to water recreation. All water used

Figure 4. Overcrowded access area. This is a frequent scene throughout the country. It can be alleviated only through further developments to meet growing water recreation needs.

Figure 5. Farm ponds do and can supply much rural recreation. Successful management for sustained fishing demands that the soil be kept on the ground where it belongs. Muddy waters can ruin fishing.

by the City of San Diego is filtered and treated: "Through the years there has been no correlation between the bacterial count of water samples and recreational use. On numerous occasions the highest counts have been at times when no recreation activities were in operation" (12).

Indeed, San Diego regards fish management activities as beneficial to its primary objective to produce safe, potable water. For example, treatment with rotenone served to remove fish from Hodges Reservoir. Its purpose was two-fold: to improve sport fishing and to improve water quality by reduction of turbidities. Both objectives were successfully accomplished (11). This kind of fishery management is commonly practiced also by many municipalities in Oklahoma in cooperation with the state conservation department. When the quality of fishing in San Diego's San Vicente reservoir recently deteriorated, the water department engaged the fishery research staff at San Diego State College in a fishery study to guide fishery managers toward an implemented management program for the reservoir.

In San Diego, it isn't a question whether fishing in the "drink" should be allowed. The question is how can it be made better? This is an example that every water department can and should follow.

In Conclusion

It is evident that recreation must be regarded as one of the important multiple uses in water-supply planning. Water-borne outdoor recreation is in heavy demand and increasing in popularity. Fishing, with its inseparable companion activity of boating, and hunting, provides the principal motivations. Responsibility for permitting these activities on water supplies is now recognized by many progressive water departments as compatible with supplying safe, potable water and also as providing important public-health benefits. Multiple use of municipal water supplies is now common practice, though still resisted by a few agencies.

Outdoor recreational use of impounded water generates substantial economic benefits to the surrounding business community. Currently realizable values per acre of water are known in many cases to exceed $50 of primary benefit from recreational fishing, representing an equivalent capital value of more than $1,250. Corresponding secondary benefits commonly exceed $150 per acre of business activity generated from sport fishing alone ($3,750 or more of equivalent capital value). Ultimate potential values are believed to be at least double these figures.

These values may be realized, however, only if proper consideration is given in water development planning to critical engineering features that may fix immutably the favorable or unfavorable limnological characteristics of the impounded water. It is also necessary to practice sound watershed management with adequate soil and erosion control practices to encourage maximum insoak and to reduce siltation to a minimum. Both pre-and-post impoundment fishery management practices must be incorporated if good fishing, upon which aquatic recreation principally centers, is to prevail.

Adequate public access facilities must be provided, including space for parking cars, and boat trailers, turnaround areas, boat launching ramps, sanitary facilities, picnic areas, and camp grounds. It is recommended that 10 acres of public access space with 500 or more feet of water frontage be provided for each 300 acres of water surface area to be serviced.

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Riverbank Stabilization in Virginia

W. A. PHILLIPS AND FRANK D. EASTHAM

TIDEWATER VIRGINIA has many bays, rivers, creeks and inlets that subject the land to serious erosion problems. This erosion is caused by the fluctuating tides, by wave action, by frost and floating ice, and by rainwater. Erosion is aggravated by winds and accompanying storms—especially when blowing from sea to land during abnormally high tides.

There are many records indicating that this problem is not a new one. Augustine Washington built a home in Westmoreland County and remarked that it would be 200 years before the Potomac would bother it. Two hundred years have about passed and the foundations are falling into the river. By the time of the Revolution the isthmus connecting Jamestown Island to the mainland had washed away. Prior to 1900, when a seawall was built, the first landing site and the site of the original fort had long since disappeared into the James. Across the river a state highway has recently fallen over the cliffs at Morgarts Beach.

Park Service excavations indicate that no less than 125 feet of the Yorktown surrender grounds have fallen into the York River. Thus many priceless historical landmarks have gone overboard, as at Jamestown. Wakefield and Stratford plantations, the birthplaces of Generals Washington and Lee, on the Potomac, are annually losing enormous quantities of timber and farmland.

Virginia, with a tidal shoreline of more than 2,000 miles, has no rocky shores or protecting marshes on much of this exposure. Maryland, with a similar shoreline, made a detailed study which indicated a loss of about 25,000 acres in 90 years, or an annual loss of about 275 acres. One area, Bay Banks, lost 40 feet in one storm. This is not merely topsoil we are losing; it is complete, final, and utter loss.

Many places in Virginia lose 20 to 30 feet of soil in one storm. Some exposed areas have an annual loss of three to ten feet. Farms, orchards, homes and timberlands are being eaten away by the steady grind of the seas. Many Colonial cemeteries have been washed away. Augustine Washington's family graveyard is now but a dozen steps from the Potomac. The river is approaching at a rate of six feet annually.

Some cliffs along the Potomac rise 160 feet above the water. Waves undercut sections, causing landslides involving thousands of tons of earth and timber. The waves remove these slides and start undercutting again. Slides carry away fields, woods, homes and highways. People and animals have perished in riverbank cave-ins.

The James, York, Rappahannock, and Potomac Rivers present the major problems, but many other bodies of water have the problem in varying degrees.

The problem is serious. Millions of dollars have been spent, often to no avail, in efforts to control the erosion of these shores. Many structures are poorly conceived, improperly built, or constructed of poor material.

Properly designed seawalls, jetties and bulkheads will do an effective job of control, but they are very expensive

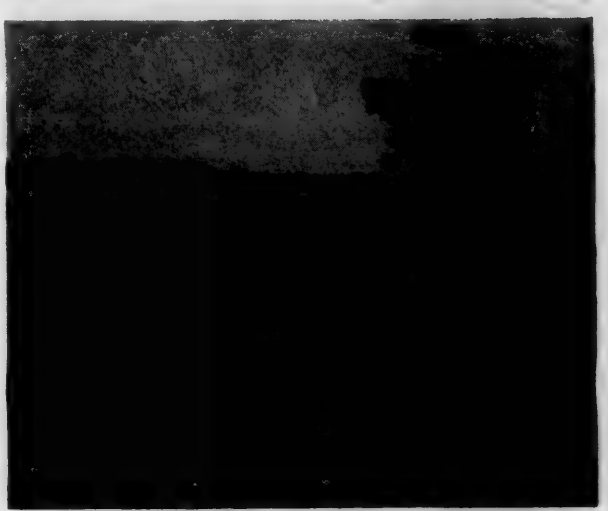

Figure 1 (above). Before treatment on Leslie Palmer's farm, Northumberland county, Virginia, erosion was active on frontage along the Potomac tributary.

Figure 2 (below). After the bank had been sloped and seeded, and the lower part sprigged with cordgrass, the shoreline showed signs of becoming stabilized. Note the use of jute cloth.

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Figure 3. Undercutting of banks on Dymer's Creek, Chase farm frontage, is a typical erosion hazard in this section of the Chesapeake Bay.

Figure 4. After the bank had been sloped, seeded, and sprigged with cordgrass, it withstood 5 to 6 feet of high water with no material damage.

to construct and maintain. Some cost $100 per foot. Most landowners simply move back as the river moves in.

The Northern Neck Soil Conservation District supervisors have long sought an approach to the problem. In 1956 they decided to concentrate on developing some practical way to reduce the loss at minimum cost.

While studying the problem and evaluating past efforts it was found that one farmer on the Rappahannock River, Mr. Fred Durham of Richmond County, had achieved very promising results with vegetation. The bank had been sloped and sodded to Bermuda grass and on the beach was well established a sod of native salt-tolerant marsh grass *(Spartina patens)*. This had previously been a rapidly eroding shoreline, but after treatment the beach began gradually moving out into the river and the marsh grass has built a dense barrier 30 feet wide between the bank and the water. This bank has successfully weathered hurricanes for 15 years. Hurricane Hazel threw seas almost to the top of the bank with no ill effects. The grass barrier absorbed much of the shock and the remaining energy expended itself rolling up and down the sodded bank. Similar banks, with the same exposure, were cut back from eight to 20 feet in this one storm.

This project merited study. The *Spartina patens* was obtained on the farm and the only cost involved was lifting and planting. The bank was sloped 2:1 and seeded to a general lawn mixture. Bermuda grass has now taken over the site.

In 1957 the supervisors decided to try this method of control on other sites with different exposures. Five sites were selected, one on the Rappahannock, two on the Potomac, and two on a creek from Chesapeake Bay.

The topsoil was stockpiled and the banks were sloped as low as possible consistent with cost. A 3:1 slope was found to be very effective. The topsoil was then spread over the exposed ground and the area was heavily manured and fertilized. Kentucky 31 fescue was seeded to within 10 feet of the water; midland Bermuda grass was heavily sprigged from the fescue to within three feet of high water. *Spartina patens* was heavily sprigged from the midland Bermuda to the mid-tide mark. *Spartina alterniflora* was then planted in rows from here to low tide. In all cases mulching of the seedbed was important.

It was soon obvious that this was no simple job. The riverbanks are exposed to extreme cold in winter, freezing to a depth of 18 to 24 inches. In summer, direct and reflected sunlight make them very hot, and the internal drainage and heat make them very dry. High tides and wind make them alternately wet, dry, windy, cold, hot, and frequently the banks are whipped by wind-blown sand and salt water. Before the banks could be seeded heavy rains and windy seas had damaged them so severely that they all had to be reworked.

Figure 5. On the farm of writer John Dos Passos, in the Northern Neck Soil Conservation District, creosoted structures were installed prior to sloping and seeding of bank. Appearance after treatment was much like that shown in Figures 2 and 4.

Sufficient midland Bermuda for the trial was obtained from the Agricultural Research Center, Beltsville, Maryland. We also used native grasses that seemed to be doing well on sites similar to those on which we were working. *Spartina patens*, *Spartina alterniflora*, and needle rush have proved to be good ones.

We have learned much from these projects. We know it is very important to apply careful and constant maintenance for at least a year. Small washouts and gullies must be quickly repaired. Several applications of fertilizer are better than one heavy application. The heavy fertilization causes a tremendous stimulation of weeds and annual grasses. These must be cut at least once a month if a good sod is to be quickly formed.

We found that a stable beach is a prerequisite to sloping. If stability cannot be obtained by use of grasses then the toe of the slope must be held with structures. Banks more than 10 to 12 feet high are risky and treacherous to slope and seed. Here excessive washing, sloughing, and sliding are likely to occur. Excess water from the land needs to be drawn off in tile lines. Sloping should be done with a dragline as it is difficult to use a bulldozer and get slopes without pushing loose dirt to the water's edge. Loose dirt here will be promptly washed away. In Virginia the topsoil should be stockpiled and the sloping done in late winter in order to get the banks seeded early. Thus the grasses will have the longest possible growing season and will get well established before the fall hurricanes and winter storms.

All bank stabilization projects have come through the first year in surprisingly good condition. The District surpervisors are well pleased with the results to date, and feel that we have found a practical approach to many of these riverbank erosion problems.

We do not think this system will work everywhere, but know that it holds considerable promise for shorelines with eroding banks of fairly stable soils that are not exposed to wide stretches of open water. ■

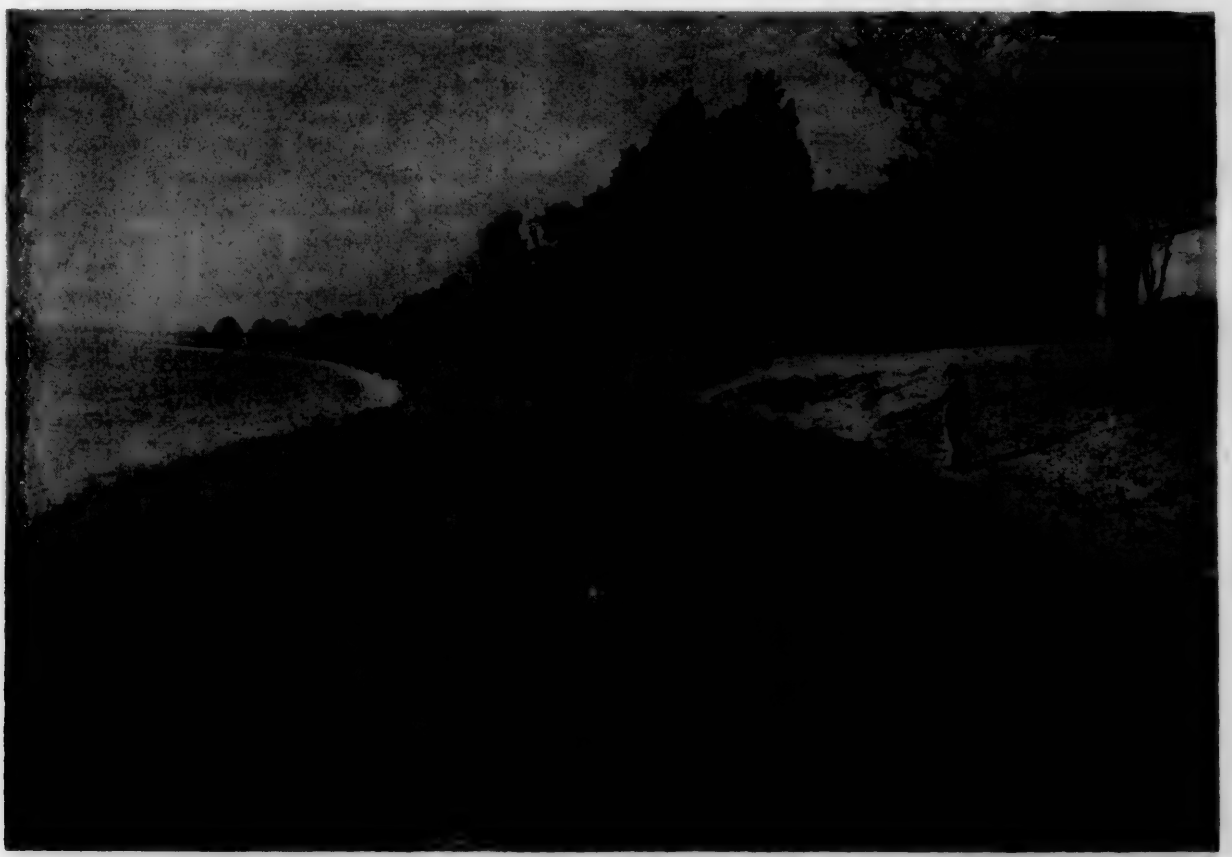

Figure 6. A belt of wild cordgrass, sprigged in 1945 by farm-owner Fred Durham, has protected this Rappahannock riverbank. A beach has been built up and breaks the force of waves.

Economic and Hydrologic Developments in the Parker Branch Watershed

E. L. BAUM AND A. J. COUTU

FARM FAMILIES living on land that has been severely eroded tend to be or become poor families unless they have large amounts of nonfarm sources of income. This relationship has been noted many times by agricultural workers. Likewise, agricultural workers are concerned with the problem of whether people are poor because their land is poor, or whether the land is poor because the people are doing a poor job of farming the land.

In 1952, representatives of TVA and North Carolina State College started a cooperative study to obtain information about the relationships between the use of agricultural resources in a watershed, the condition of soil and water resources, and the economic well-being of farm people. In brief, how would the hydrologic characteristics of a watershed be affected if the people, operating farms on eroded land, made improved uses of the land along with other resources that would result in maximum net revenue to the farm families. In addition to improved net farm incomes, it was hoped that the losses of soil would be greatly reduced and that other hydrologic factors would be substantially improved. In this study the income effect was dominant. Maximum levels of conservation control were not considered. Land resources were classified relative to short-run productivity which appeared to be consistent with the low income conditions.

The area selected for this research project, Parker Branch Pilot Watershed, is located in western North Carolina about nine miles northwest of Asheville. The watershed contains 1,060 acres owned by 47 landowners in 1952, three-fourths of whom were part-time farm operators. The part-time farming situation, small land holdings, and other physical, economic, and sociological resources are considered typical of a large part of western North Carolina. A very important factor that contributed to the selection of this particular watershed in which to conduct research was the willingness of the people in the area to cooperate. At the start of the project, 49 per cent of the watershed was in cropland and unimproved pasture, 28 per cent was in forest, and 23 per cent was classified in miscellaneous uses, viz., idle or abandoned land, public roads, homesites, etc. Erosion had removed most of the original topsoil, and much of the area was severely gullied. Over 56 per cent of the land has slopes steeper than 15 per cent. Topographically, the watershed is well defined. Soils are predominantly clay loam.

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Objectives

The specific objectives of this experimental watershed project are:

1. Develop long-range farming systems for achieving maximum efficiency in resource use and economic well-being of the people who control farm production resources.
2. Determine the physical and economic relationships of efficient agricultural resource use to sediment production, peak discharge rates and streamflow yield for a small watershed.
3. Procure cost information needed in estimating the amount of public funds that can be justified to improve watershed cover in tributary watersheds and alternative developmental programs.
4. Develop techniques to help people who farm the land so as to improve their farm incomes and levels of living through the use of sound managerial and operational practices.

The above objectives were selected in order to answer the following questions:

1. How will the adjustments in resource use affect the hydrology of this tributary watershed? What is the magnitude of changes in hydrologic variables as compared with the benchmark (calibration) period? Will the land-use adjustments the farmers make to obtain optimum net farm incomes worsen or improve the hydrologic conditions within the watershed?
2. Given farm planning programs that recognize total resource restrictions (labor, capital, managerial, as well as land limitations) that aim at maximizing net farm income, what is the maximum net farm income each farmer can obtain?

3. What are the total costs necessary to change the aggregate farm incomes (both in public and private costs), and how does private investment during the benchmark period compare with the investment under the improved farming systems?
4. If the objective of this watershed study were changed to one of minimizing soil erosion, what would be the maximum net farm income levels? (The research methodology associated with this condition was developed recently for application to this watershed.) How would these income levels compare with net farm income levels during the calibration and evaluation periods of the project?
5. If the objective of the study was to minimize erosion, rather than to maximize farm income, how would the hydrologic conditions under minimum erosion compare with those actually recorded during the benchmark-evaluation periods of the project?
6. How would the private and public costs differ for watershed programs conducted under the two objectives and resultant methods?

Methodology

The procedure for conducting the project consisted of three phases. Since the major objective was to determine the effects of changes in total resource use on other variables, it was necessary to measure the relation between total resource use and the dependent variables (income and hydrology) under the initial conditions during the benchmark period. A weir was constructed on the branch that drained the watershed in order to obtain records of streamflow and associated hydrologic characteristics including sediment losses and to relate these to land cover classes. Precipitation also is being measured. Sufficient time was allowed to establish reasonable prediction equations relating hydrologic characteristics to weather conditions under the then existing land use in the watershed. It was thought by hydrologic engineers that approximately two years of measurements was necessary in this initial calibration phase.

During this phase of the study, data were obtained pertaining to the relation of farm and nonfarm incomes of farm families in the watershed to resource use. The types of production practices employed on the farms were determined and the productivity of land and labor resources was estimated. During the calibration period, optimum long-range farm plans, from the standpoint of the economic potential of the watershed, were developed for each of the farms in the watershed.

When sufficient hydrologic data were obtained to characterize the watershed under the initial conditions and alternative farm plans had been analyzed and all initial courses of action decided upon by individual farm operators in the watershed, the action phase of the project commenced.

This phase consisted of a transition from the prevailing farming systems to the improved farming systems. During the transition, farm operators were given advice on (a) making land use changes; (b) incorporating new enterprises and new production practices into their farming systems; and (c) making continuous evaluations of additional alternative uses of their resources.

In order to minimize the length of the action phase and to provide some incentive for the farmers to delay making large-scale changes during the calibration period, certain subsidies were given to the farmers in the form of fertilizers and seeds and some of the costs of using heavy machinery necessary in making the transition to the improved farming systems.

The action phase took about four planting seasons for forage crops; therefore, about two years were involved.

The final phase of the project is concerned with the evaluation of the changes in resource use on incomes and levels of living of the farm families and on the hydrologic characteristics of the watershed. There is involved the estimation of the net revenues to farm families after the transition has been completed and a comparison with the net revenues in the calibration period. The effects of changes in the real value of the dollar will be incorporated in the final net income analysis at the conclusion of the study. The preliminary net income estimates have not been adjusted for such changes. Also, data for the evaluation period which were comparable to those obtained during the calibration period are being analyzed to determine the effects of changes in land use on hydrologic characteristics. Principal concern is being given to streamflow with regard to peak discharge rates, sustained flows, total watershed yield, and sediment loads for storms of given intensity.

Hydrologic Aspects

The hydrologic phases of this project are conducted by TVA's Hydraulic Data Branch. During the calibration period, a sufficient number of storms occurred to provide excellent hydrologic data for use as a benchmark for future comparisons during the evaluation period. Mean annual precipitation in the area is only thirty-nine inches; however, intense thunderstorms occur quite frequently in the summer months. Based upon 54 years of precipitation records at the Weather Bureau in Asheville, North Carolina, the expected frequency of occurrence for the observed maximum 15-, 30-, 60-, and 120-minute rainfall intensities at Parker Branch during the calibration period is about once in 25 years.

Hydrologic installations include a recording rain gauge and two non-recording rain gauges, a weir and continuous

streamflow recorder with a collecting basin just upstream for bed-load deposition, and an automatic suspended sediment sampler for flow passing the weir. In order to provide accuracy at low flow as well as sufficient capacity for flood discharge of ordinary expectancy, a modified Albany weir was selected. Maximum capacity of the weir is 387 cubic feet per second, however, the nonoverflow section of the weir lends itself to computation of flows in excess of the capacity of the overflow section. The concrete weir has an over-all length of 90 feet, with maximum height of 9½ feet, and is founded on granite. The overflow section is 20 feet wide. Drainage area above the weir is 1.51 square miles.

Since the installation of the weir, flow has ranged from a minimum of 0.193 cubic foot per second to a maximum of 583 cubic feet per second. Average flow is about one cubic foot per second, producing an average annual runoff of nearly nine inches. The capacity of the overflow section of the weir has been exceeded three times by peak rates of flow of 556, 570, and 583 cubic feet per second.

The automatic suspended sediment sampler was constructed in conjunction with the weir and continuously diverts 1/100,000 of the flow into an 8 x 12 x 4-foot deep sediment tank.

The sampling is accomplished in a series of steps in each of which a proportional part of the flow passing that step is retained and the balance wasted. A brass plate located in the measuring weir structure takes an initial sample of 1/100 of the total flow. At the next splitting point, 1/10 of this reduced flow is retained, and this is followed by another divider which takes ½ of the remainder. At this point, the sample is directed to a pair of tipping buckets where the final splitting with retention of 1/50 of the flow at this point takes place just before the sample flows into the storage tank. Weekly, or more often if desired, the tank contents are thoroughly stirred and representative pint-sized samples are taken. These samples are forwarded to the TVA Hydraulic Laboratory at Norris, Tennessee, for analysis of the sediment content in parts per million by weight.

During the calibration and action periods, suspended sediment concentrations have ranged from a minimum of 2 parts per million to a maximum of 24,100 parts per million. In addition to the suspended sediment, the deposited sediment was also measured. The latter was obtained by cross sectioning established sediment ranges above the weir and computing the volume by the average-end method. Since initiation of the project in March 1953, it has been necessary to clean out the basin nine times with a dragline and trucks—a total of about 5,600 cubic yards of material. The total sediment load amounted to a soil loss of about 3 tons per acre per year during the calibration period and about 2 tons per acre per year during the action period. About 80 per cent of the sediment load occurred during the growing season months of April through October. Also, about 80 per cent of the suspended sediment load was carried by twenty storms with peak rates of 100 cfs or more, out of a total of 158 peak storms.

During the calibration period, prediction equations were developed in order to form a basis of comparison to evaluate the hydrologic changes that are anticipated with the changes in resource use. Throughout the period of the project, periodic cover surveys have been and will be made to evaluate the extent of the changes in cover. The prediction equations will be fitted to land use and hydrologic data for all periods. Parameters of watershed cover will be included in the equations to correlate the changes in cover with the changes in the hydrology of the watershed.

It was not anticipated that strong hydrologic changes would be observed during the action phase of the project. Renovations of large areas with consequent continuous changing of the watershed condition would obscure hydrologic differences from the calibration period. At the end of the action phase the following general hydrologic response was being noted:

- Peak discharges during the winter season have been reduced
- Storm runoff volumes have not been changed
- Suspended sediment loads have been reduced in both summer and winter seasons
- The character of deposited sediment has changed from a fine silty material to a coarse sandy deposit
- There has been no detectable change in water yield.

Economic Aspects

Enterprise Adjustments: During the calibration phase of this study, beef and tobacco enterprises accounted for more than 75 per cent of the total farm income. In addition, most of the other agricultural resources were used in subsistence enterprises. Following the extensive land use changes described below, the major enterprise adjustments in the watershed have resulted in the addition of dairying, poultry, and specialty livestock and crop enterprises. Plans have been developed for various types of forestry enterprises which were included in adjusted farming systems where they were found to be economically feasible. The development of workable leasing arrangements and the consolidation of farms by direct purchases have contributed appreciably to the efficient use of available resources in the establishment of these new enterprises. As of January, 1959, six farms were sold to four farmers in the watershed; and during 1959, nine farmers will have cash or share leasing arrangements with 10 landowners within the watershed.

Changes in the Productivity of Resources: In the process of developing farming systems for maximizing net farm incomes, the farm operators have increased their capacity for management, and their understanding of the role of improved agricultural technologies, such as improved fertilizers, fertilizer practices, use of improved land preparation and newly developed seeds, insecticides and pesticides.

The average yields per acre during the action phase presented in Table 1 are much lower than the yield expectations budgeted at the start of the project, but the increases within the short period are quite consistent with the extremely low level of soil fertility, the frequent drought conditions in this area of low rainfall, the high degree of land erosion (about 60 per cent of the watershed was classified as 3, 33, and 33-7 and 8 erosion classes), and the low level of management during the period of activating the project.

TABLE 1

Average Per Acre Crop Yield Increases in the Parker Branch Project, 1953-1957

Crop	Unit	Calibration Phase	Action Phase	Average Yield Increase	Per Cent Increase
Burley tobacco	lbs.	1,331.0	1,650.0	319.0	24.0
Grain corn	bu.	38.5	49.0	10.5	27.2
Silage corn	ton	9.5	11.2	1.7	17.9
Alfalfa hay	ton	1.15	2.6	1.45	126.0
Wheat	bu.	23.0	28.0	5.0	21.7
Mixed hay	ton	0.65	0.9	0.25	38.5

During the calibration phase of the study, the average acre of pasture would support one-fourth of an animal unit. Since the extensive renovation of 416 acres of pasture, the grazing rates have increased three-fold to three-fourths of an animal unit. In addition, increases in physical productivity have occurred in grade A dairy herds (approximately 100 per cent increase in milk production per cow), and pig farrowings (an increase from 5 to 9 pigs per litter). The rate of gain in beef production has also increased significantly.

These increases in physical outputs per unit of input have resulted in significant increases in the returns imputed to land, labor, capital and management.

Total Resource Use Changes: The total changes in resource use include adjustments in land use, private and public investment capital, labor utilization and adjustments in managerial attitudes and abilities. The adjustments in the use of these resources on individual farms within the watershed are related to changes in net farm income, nonfarm income and/or total family income. Throughout the study the changes in resource adjustments have involved intrafarm, interfarm and interindustry considerations.

Aggregate land use changes have included substantial increases in the amount and quality of pasture and semipermanent types of land use conditions, reductions in the amount of land devoted to annual crops, substantial reductions in the quantity of woodland, as well as reduction in the amount of idle and abandoned land (see Table 2 and Figures 1 and 2). During the base period (defined as the crop years 1953 and 1954) approximately 49 per cent of the watershed area was planted to unimproved pasture, semipermanent covers, or annual crops as compared with 74 per cent of the watershed area in improved pasture and these other crops near the end of the action phase.

TABLE 2

Economic Land Use Classification in Parker Branch for the Base Period and Action Period by Type of Land Cover

Type of Land Cover	Base Period (1953-1954) Acres	Per Cent	Action Period (1957) Acres	Per Cent
Cropland:	296	28	377	36
Alfalfa	26		238	
Annual crops	270		139	
Pasture	225	21	405	38
Woodland	297	28	199	19
Other[a]	242	23	79	7
TOTAL	1,060	100	1,060	100

[a]Includes acreage classified as idle or abandoned land; public roads, water surfaces (16 acres); homesites, barns, and similar structures (13 acres).

Since the initiation of the action phase in August 1955 total private and public investments within the watershed are estimated at more than $126,000. This amounts to an average investment for land use changes, buildings, equipment, land purchases, livestock and miscellaneous items of approximately $2,800 per farm. Private investments by individual landowners represent more than 62 per cent of this total or approximately $1,750 per farm. Public investments include assistance on clearing land, seeds, and fertilizers for land organizations. It has been estimated that in order to complete proposed resource use adjustments on the individual farms that the average private investment per farm will approximate $2,000, or an additional $250 per farm. Public assistance will continue throughout the project, but at much lower levels as the project nears completion.

The division of labor resources between farm and nonfarm work has remained fairly constant. However, the use of labor per unit of agricultural output has shown significant decreases. This change has occurred by substituting capital for labor and decreasing the amount of underemployment in agricultural activities.

Managerial aspects of this study are difficult to appraise. The rate at which resource use changes are being

Figure 1. This Class 4 forestry land-use cover (F4) represents a condition where the soils are less than 12 inches in depth. There is less than 1 per cent of the A1 horizon remaining. Summer infiltration rates are estimated at less than 0.24 inch per hour.

Figure 2. The same site as shown in Fig. 1 with a Class 2 pasture cover (P2). Sod cover is complete, not overgrazed or trampled. The summer infiltration rate is estimated at 0.44 inch per hour.

made and the very wholesome attitude toward additional resource changes indicate large adjustments in managerial attitudes and abilities. The process of recognizing problems, analyzing alternative solutions, and initiating resource adjustments has undergone continuous change in the watershed. Continued progress toward attaining maximum net farm income will demand even greater changes in managerial attitudes and abilities.

Income Changes: These changes in management, land use, investment capital, and labor efficiency are reflected in the income changes that have occurred in the watershed. Total net farm income at the end of 1957 was approximately $42,000 as compared with a base period total net farm income that averaged approximately $14,000 for 1953 and 1954. This represents an increase of more than 200 per cent and is approximately 65 per cent of the anticipated or planned change in total net farm income. The data in Table 3 provide a more complete summary of income changes within the watershed.

TABLE 3

Farm and Nonfarm Income Summary 1953 and 1954 Compared with 1957

Type of Income	1953 and 1954		1957	
	No. of Farms	Dollars	No. of Farms	Dollars
Total net farm income	32[a]	13,660	39[b]	41,680
Average net farm income	32	427	39	1,069
Total net farm income to part-time farm operators	24	4,326	25	12,320
Total net farm income to full-time farm operators	8	9,335	14	29,360
Total nonfarm income of part-time farm operators	24	76,440	25	85,260

[a]In 1953-1954, fifteen landowners received no income from their farm resources. These people were classified as inactive landowners.

[b]The number of farms had decreased from 47 to 45 in 1957; six of these landowners were classified as inactive.

In Projection

The answers to the questions on alternative approaches to watershed development cannot be appraised until the evaluation phase is completed in 1962. Preliminary results thus far indicate that farmers can develop farming systems for maximum returns, and yet be consistent with the desired hydrology of the watershed. The magnitudes of income and hydrologic relationships under watershed systems have yet to be determined. This much-needed knowledge should test the consistency of income and conservation goals in watershed development.

We have learned that farmers operating low-income farms do respond to farm management techniques that provide for complete evaluation of alternative uses of their limited resources. These people have learned that the returns for acquiring additional managerial abilities and the application of improved resource use practices far exceed the real costs of securing the improved levels of knowledge and practices. The acquisition of managerial abilities has also led to reductions in risk aversion which provides for the recognition and ability to adjust resource uses consistent with changing agricultural conditions.

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FLOODS, FROST, AND FORESTS

The disastrous floods that swept across many parts of Ohio early in 1959 forcefully reminded the public and technicians that uncontrolled water is still a big problem. When the recent Ohio floods had subsided and most of the cleaning up had been done, the public aroused itself and demanded to know "Why?".

The origin of the floods can be traced to one unfortunate situation: *Heavy rainfall on frozen ground.* A lot of water fell in a short time, and because it could not seep into the soil, most of it ran off the surface almost as fast as it fell.

Many people do not realize that the biggest and best reservoir is the soil itself. A good, deep, porous soil can store a tremendous amount of water. Usually this water then gradually percolates underground to rivers and streams. When the system is working right, rain that falls one day may not find its way into open water until weeks or even months later. But—when the ground is frozen the channels of percolation are closed. There is nothing left for the water to do but run away over the frozen surface and cause trouble.

Some soils freeze up so tight that they are said to contain *"concrete frost"*. This is an impermeable layer at the surface of the ground that sheds almost all the rain that falls on it. Two days before the recent Ohio January flood, researchers with the Central States Forest Experiment Station (a branch of the U. S. Forest Service), in making routine observations, found three inches of concrete frost on open land in east-central Ohio. Wet conditions had been followed by extremely low temperatures. When the heavy rains came, it was just as if the water were falling on pavement.

What can we do to prevent soil from freezing like this? At first, this may seem like a silly question. After all, when it gets really cold, doesn't all the ground freeze solid? After close examination watershed experts at the forest experiment station think not. It seems some soil does not freeze as soon or as hard as others. In fact, during 4 years of study the researchers seem to have found that forest soil in Ohio does not develop concrete frost at all!

This means that most of the rain that fell on forest land during the recent flood periods did not run off immediately. Some of it was at least temporarily delayed and did not reach the streams and rivers at the same time the peak flow from the frozen ground did. In other words, without forests, the floods would have been much worse!

There are two reasons why forest soils rarely freeze: In the first place forest soil is kept warm, literally, by a blanket of litter—tree leaves and other decaying vegetation. And second, the decaying action itself forms acid solutions that serve as a natural "anti-freeze" in the soil.

This is interesting information, of course, but what can it be used for? After all, we can't convert all land to forest just to keep the ground from freezing. Granted. But we *can* take good care of the forests we have so they will be ready and waiting to catch and hold excessive rainfall.

Foresters agree that much of Ohio's so-called "idle land"—land that has been abandoned because it is too steep and/or too poor for farming—should be allowed, and helped, to revert to forest. A good part of such land is located in hilly country where uncontrolled runoff can be very damaging. Converted to forest, this land would add about ¾ million acres to Ohio's winter reservoir.—ROBERT D. WRAY, *Columbus, Ohio.*

WESTERN RESOURCES CONFERENCE

The transactions of the Western Resources Conference (see July JOURNAL for announcement) are in process of being edited. The publication, which will include all the papers, will be available sometime after November 15 from the University of Colorado Press, Boulder, Colorado, at $3.75.

TWO FELLOWSHIPS AWARDED IN WATERSHED MANAGEMENT

Colorado State University recently was awarded two National Defense Fellowships for graduate study in watershed management by the United States Department of Health, Education and Welfare. The fellowships are designed for training additional college and university teachers.

Richard Lee and Roger Hoffer, both 1959 honor graduates in forestry at West Virginia University and Michigan State University respectively, have been named the recipients of these fellowships starting in September 1959.

In addition to the two in watershed management the University was awarded three fellowships in botany and two in soil science.

FUTURE WATER NEEDS AND NESHAMINY VALLEY

Neshaminy Valley watershed lies in Bucks County, Pennsylvania. Bucks County does not have a Soil Conservation District. However, it does have an organization, the Neshaminy Valley Watershed Association, Inc., with about 170 individuals and 22 groups as of June, 1959. At its third annual meeting, May 17, 1959, the members heard a progress report on the Corps of Engineers survey of the Delaware River Basin.

The Neshaminy Creek covers 236 square miles (1.9 per cent of the 12,757 square miles of the Delaware River Basin) and contains about 100,000 people (1.5 per cent of the total population of the Basin). The Basin's population is now about 20 million (13 per cent of the U. S. total) and is expected to reach 30 million by 1980.

The NVWA realizes that proposals forthcoming from the survey of the Delaware Basin will greatly affect the Neshaminy watershed and creek. The Association knows that if local people don't show some interest, some one else will—and, that water resources are mighty tempting these days. Therefore on a local basis this Association is striving to bring forth helpful information so that problems can be aired and resolved and *the local people can have something to say as to how their watershed is going to be developed.*

(For further information write, N.V.W.A., Box 428, George School, Bucks County, Penna.)

RANGELAND DRILL TESTED

A rangeland drill under test by University of California specialists since 1956 may lead the way to better pasture and more meat production from the state's 30,000,000 acres of rough range.

The machine tested is a heavy duty drill capable of negotiating the uneven, rocky areas of range to sink grass seed and fertilizer into dry soil. Researchers have found that the careful seed planting allowed by the machine produces good forage crops and will enable the establishing of a selected variety of grasses and legumes.

Test plots have been established in 21 counties on a variety of range types: control-burned brushland, cultivated seedbeds, sprayed sagebrush, burned and unburned medusahead range and others. On one test plot in Mariposa county, seed drilled with the test machine produced appreciably higher yields than were obtained by broadcasting seed. Seed broadcast and covered with a ring roller produced 2,040 pounds of dry forage per acre, while drilled seed gave 2,990 pounds per acre. The best results on this plot came from drilled seed fertilized at drilling with 450 pounds of single super phosphate per acre in the furrow. The result: 3,140 pounds of dry forage per acre.

The drill method provided what seemed to be the most important factor in growing rangeland pasture—a careful placement of the seed. On rangeland this careful planting is of decisive importance, since the operator has little or no control over moisture, fertilization is costly, and regular cultivation is impossible. The better germination given by the drilling method seems to insure the establishment of good pasture.

The machine used in the University tests was a modified rangeland drill originally developed by the United States Forest Service. The standard drill is 13½ feet wide and seeds ten rows one foot apart. The modified model used by the University is eight feet wide. Each of five disk-seeders on the machine is hinged to climb over rocks stumps, brush, and other obstructions. It can drill fertilizer and seed into the soil and cover the seed in one operation.

DRILLING BURNED RANGE—Heavy-duty range drill seeds burned brushland in San Diego county. Five fertilizer boots at the back of the machine deliver fertilizer or seed into furrows opened by disks. Tractor trails a ring roller to cover seed.

HOW TO GET SOME THINKING

Demand, Supply and Balance, developed under the auspices of the Conservation Foundation, is another definite and important step forward in the development of some very fine "conservation" audio-visual aids. *Demand, Supply and Balance* is a set of 35mm. filmstrips in color, three filmstrips each for elementary, junior high and high school levels.

Uniquely each of the nine filmstrips raises many fundamental questions about resources and use but does *not* answer them. The answers are left up to the viewers who are "forced" or "led" to do some thinking about the future consequences of "increasing demand" and "diminishing supply" of natural resources. The viewers are also required to engage in some thinking about technological and sociological changes which can be applied in "maintaining balance."

To aid teachers and others in using the filmstrips to best advantage, three grade-level guides are available. Each guide contains reproductions of all the frames in each related filmstrip, as well as suggestions for use. Science and social science classes will make greatest use of the filmstrips.

By writing IMPCO, Inc., 20 Foster Street, Bergenfield, New Jersey, you can obtain further information. Please mention the JOURNAL when you write.

Here are some visual aids that show much ingenuity. The approach suggested will — if followed — stimulate viewers to do some thinking on their own about conservation of natural resources.

FALLOUT DECONTAMINATION

It is possible to achieve 90 per cent or more decontamination of agricultural land from radioactive fallout by raking off straw mulch, removing sod or scraping off surface soil, USDA research workers have found. On the other hand, removal of standing crops was largely ineffective.

U. S. GEOLOGICAL SURVEY WATER STUDIES

New scientific and engineering studies by the Water Resources Division of the Geological Survey still stress basic data collection—but with a difference.

Our growing population obviously requires more and more water of suitable quality, but if problems of flood and drought are to be met successfully, not only must a vast body of water statistics be gathered each year, but more attention must be paid to interpretations of those statistics, and to putting such new knowledge to work.

Exceedingly intricate factors are involved, and physical laws only partially defined. The talents of several hundred Survey engineers, geologists, chemists, physicists and mathematicians experienced in hydrology are required.

Cooperative and standard long-term projects vary from the collection and analysis of water records, such as streamflow, ground-water levels, chemical quality of water, sediment load, evaporation, etc., to complex hydrologic investigations and instrument research.

The results are published by the Survey as reports and maps for use by engineers and a variety of other professional persons as well as the general public.

The following are examples of projects in progress:

Hydrologic Investigation of the Delaware River Basin. This project will bring together in a single report summaries and interpretations of all presently available knowledge about the water resources of an extremely important river basin—lifeline of a prosperous industrial area and the controlling water supply of several heavily populated states.

The investigation includes studies of the occurrence, availability and characteristics of surface- and ground-water supplies, the occurrence of suspended sediment, and the extent of sea-water encroachment into river channels and underground reservoirs.

It also includes studies of the present use of water in the Delaware Basin and the adjacent coastal areas that are now or may at some time in the future be dependent upon the Delaware River for water.

The Upper Colorado River Basin. This is an appraisal study of water resources of the Upper Colorado River basin with emphasis on water quality. The report on this investigation will identify the hydrologic and geochemical relationships of the basin's surface- and ground-water supplies. These relationships will be related to climate, topography, geology and activities of man.

Water Resources of the Mississippi Embayment Area. The Survey is appraising the water resources of the Mississippi Embayment area, with special emphasis on the hydrology of the principal water-bearing formations underlying parts of Alabama, Mississippi, Tennessee, Kentucky, Missouri, Arkansas, Louisiana, and Texas.

Pascagoula River Basin. In cooperation with the Jackson County Port Authority (Mississippi), the Survey is determining the quantity and quality of the surface and ground waters in the Pascagoula River Basin. Special attention will be given to salt-water intrusion in tidal reaches of streams and ground-water reservoirs. A determination is being made of the factors involved in the mechanics of diffusion at the boundary between salt and fresh water in water-bearing formations in coastal areas. The knowledge gained from this study will provide a better basis for developing ground-water supplies in areas where salt-water contamination, through encroachment of ocean water, is a potential danger.

Land Subsidence. As part of its program in cooperation with the California Department of Water Resources, studies seeking to understand the details of land surface subsidence which results from withdrawal of oil or water are being made. Also a study of the effects on water-bearing formations in the San Joaquin Valley is underway.

In a related research project an investigation is being made of the geologic and hydrologic factors that underlie the causes of the subsidence and the effects on the underlying water-bearing formations. This study is expected to provide a better understanding of how water is stored and released in artesian water-bearing formations.

Effect of Vegetation Modification. This project concerns the conservation of limited water supplies by determining the effect on water yield and soil moisture of an area when piñon and juniper vegetation is eradicated and replaced by grass. Experimental work is centering in the Carrizo and Corduroy Creek areas of Arizona.

Glaciological Research. The Survey is conducting research on the peculiarities and behavior of glaciers, especially their movement, growth and shrinkage. Changes in glacier behavior, properly interpreted, furnish a sensitive indicator of climatic changes, helping us to predict the resultant effects on water supply. South Cascade Glacier in the state of Washington provides the locale for current operations.

Evaporation. This work involves research in the mechanics of evaporation from water surfaces and experiments seeking to develop effective methods of suppressing evaporation in order to reduce water loss. Tests are being conducted in several small lakes to determine the effectiveness of cetyl alcohol compounds, particularly hexadecanol, in reducing surface evaporation. Results to date have been encouraging but inconclusive.

Flow through Porous Media. Chief purpose of this study is to determine the factors involved in the microscopic flow of fluids through porous media. The study is directed toward the examination of the paths of individual "liquid particles" by both laboratory experiments and theoretical analysis. The study is fundamental to the problem of disposing of contaminants, such as radioactive waste, into the ground.

Radioactive Waste. Disposal of radioactive wastes resulting from military and civilian use of radioisotopes is a potential hazard to surface and ground-water resources. Studies are being made to show the effect of intentional or accidental disposal on water supplies.

Tracing Water with Tritium. Radioactive tritium, an isotope of hydrogen, possesses properties that make it useful for tracing the flow of water in streams and underground. The relative age of water, from time of falling as rain or snow, also can be determined if the age does not exceed about 30 years. This project involves laboratory measurements of tritium and studies of the movement of water and suspended sediment that have been exposed to tritium from natural or man-made sources.

Quality and Quantity of Flow in Major Rivers of the World. This is a study of the chemical quality and quantity of water discharged into the oceans by more than 60 of the major rivers of the world. The work is being done in cooperation with the International Union of Geology and Geodesy.

Flood-frequency Analyses. The proper design of highways and the design and maintenance of bridges, dams, levees, and other structures subject to the destructive forces of floods, depend upon reasonably accurate fore-knowledge of how severe such floods are likely to be and the frequency with which the maximum and other floods may occur. Evaluation of the flood risk to residential, farming, and industrial activities in flood-plain areas is a national problem whose importance is

growing about in proportion to the growth in real estate developments and industrial or farming activities in those areas. Thus flood-frequency statistics and analyses are prerequisite to the development of flood-plain zoning.

Hydrologic and statistical analysis and studies of historical streamflow records allow engineers to predict the probable future frequency of floods of various magnitudes. The survey has made pilot studies in New England to test and improve current methods of analysis. Reports have been published on flood expectancy in several areas.

U. S. STUDY COMMISSION SOUTHEAST RIVER BASINS

The U. S. Study Commission, Southeast River Basins, was created by Public Law 85-850. Legislation creating the Commission was introduced by Senator Richard B. Russell of Georgia with all Senators from Alabama, Florida, Georgia, and South Carolina co-sponsoring the legislation. Companion legislation also was introduced in the House of Representatives.

The Commission is made up of a member from each of the states of Alabama, Florida, Georgia, and South Carolina and a member from each of the principal land and water Federal agencies: Army, Commerce, Health, Education and Welfare, Agriculture, Interior, and the Federal Power Commission. The Commission is headed by a Chairman, so that the total Commission is made up of eleven members. All members are appointed by the President, those representing the states having been recommended and nominated by their respective Governors.

Following approval of Public Law 85-850 on August 28, 1958, the Commission members were appointed by President Eisenhower on December 16, 1958. The Commission held its organizational meeting on January 12, 1959, in Atlanta, Georgia. Headquarters is located in the Walton Building, Cone and Walton Streets, Atlanta, Georgia. Mailing address is P. O. Box 953, Atlanta, Georgia.

Its primary purpose is to provide for an integrated and cooperative investigation concerning the conservation, utilization and development of the land and water resources of the designated Southeast Area. The scope of study, looking towards attaining maximum public benefits, will embrace: flood control, water supply, navigation, reclamation, irrigation, drainage, hydroelectric power, industrial development, fish and wildlife, reclamation, water quality control, sediment, salinity, pollution abatement, public health, soil conservation, and forest conservation.

The area of study is approximately 90,000 square miles and includes the watersheds of the following basins: Apalachicola-Chattahoochee-Flint Rivers, Ochlockonee-St. Marks Rivers, Oconee-Ocmulgee-Altamaha Rivers, Perdido-Escambia Rivers, St. Marys-Nassua Rivers, Satilla River, Choctawhatchee River, Suwannee River, Ogeechee River and Savannah River —including all intervening areas.

Each of the four states plays an important role in the Commission's study. Many studies, reports, and general information already are existing in the state agencies and these will be utilized to the fullest extent. To this end, the Commission seeks the cooperation of various state departments, agencies and local interests in Alabama, Florida, Georgia, and South Carolina and at the same time pledges a cooperative spirit on the Commission's part in working with local groups at all levels.

The Commission stresses three features of the enabling legislation in its contacts with the officials in each of the four states:

- The officials of each state and Federal agency will be consulted during the course of the study and their views and suggestions solicited.

- Each of the Governors and agencies will be given ample opportunity to review the Commission's proposed report and to make recommendations, comments and written views before the final report is submitted to the President. All such recommendations, comments and views will be transmitted with the report, whether or not adopted by the Commission.

- The Commission recognizes the primary responsibilities of the states and local interests in fostering development and in promoting sound utilization of land and water resources and the Federal Government should cooperate with states and local interests in developing such water supplies in connection with the construction, maintenance, and operation of Federal navigation, flood control, irrigation or multi-purpose projects.

In addition to the use of existing reports, surveys, studies and general information available from the various departments and agencies of the four states, the Commission plans to utilize special staffs from colleges, universities and organizations in the area for additional information needed by the Commission's staff in the preparation of the final report.

Tentative plans call for the Commission's report to be available in draft form in 1961 with submission of the final report to the President soon thereafter. The date is tentative and will be subject to possible modification due to factors such as the availability of funds, the recruitment of the Commission staff and the resolution of the many complex problems that will be encountered during the course of the studies.

Commission members include: J. W. Woodruff, Jr., Chairman; Major General Frank M. Albrecht, Department of the Army, Vice-Chairman; James M. Hammond, South Carolina; Ralph C. Hammond, Alabama; Lester S. Moody, Georgia; Thomas A. Johnson, Florida; Howard W. Chapman, Department of Health, Education and Welfare; Walter A. Gresh, Department of Interior; William E. Hiatt, Department of Commerce; Robert C. Price, Federal Power Commission, and John A. Short, Department of Agriculture.

AN ASPECT OF AIR POLLUTION

Concentration of ozone gas in slow-moving, polluted air may be cause of injurious lesions—called "weather fleck"—on growing tobacco leaves.

This is the first known injury to any organism traceable to the gas in Eastern States, where concentrations of ozone were previously believed low. Losses from weather flecking have exceeded $1 million in some years in production of cigar-wrapper tobacco in Connecticut Valley and have been reported even greater in Ontario. Fleck also is known to damage tobacco grown in Maryland and North Carolina.

Ozone is normally present in atmosphere in harmless amounts. Excessive amounts are generated chemically when sunlight contacts air contaminated by fumes from auto exhaust, industrial plants and other sources. [An interesting article on ozone, "Climatic pulsations and an ozone hypothesis of libraries and history" by Ellsworth Huntington was published in *Conservation of Renewable Resources* (University of Pennsylvania Press, 1941).]

—SCSA—

An excellent paper on some fine rural work is "Community Education in Southern Illinois" by Richard W. Poston, pp. 268-282, in *Community Education*, University of Chicago Press, 1959.

OPTIMUM WATER YEAR

An optimum water year—new concept in watershed analysis—can help hydrologists and others plan water conservation and manage a basin's land resources.

Like calendar and fiscal years, a water year is a grouping of months for a specific purpose—in this case, for analyzing data on rainfall, soil moisture, and streamflow of an area. The time you start the statistical year makes a difference in how reliably you can discern a true streamflow pattern, the basis for water-control design and specifications. Public agencies giving technical aid to watershed planners and also passing judgment on water-control projects financed under the Watershed Protection and Flood Prevention Act will be helped.

USDA scientists have found that starting the annual period for record analysis when ground recharge is highest makes it possible to predict more accurately the seasonal changes in soil moisture and in water runoff. For larger stream basins, long-term rainfall and runoff records are generally available and can be used in making reliable and usable estimates of water yield. Unfortunately, basic runoff data from smaller upstream agricultural watersheds are scarce, though the need is urgent. The concept of an *optimum water year*, however, allows planners to estimate runoff water when rainfall records are the only water data available.

Demand for accurate estimates of water supply from smaller watersheds has grown enormously in recent years, as industry and urban developments in headwater areas continue to expand, while rural water needs, particularly for irrigation, also increased.

You can plan maximum supply for all water users in the smaller watershed, however, with incomplete records. It takes annual streamflow estimates, for example, to plan a reservoir, but planners could fall back on well-known rainfall-runoff relations that apply in all watersheds. And it is also possible to apply such relationships from a gaged watershed to the ungaged area.

The optimum-water-year concept greatly refines rainfall-runoff relationships and estimates based thereon.

Runoff and rainfall data for an annual period or water year are used to predict how certain land uses and conservation practices affect runoff. For many small agricultural watersheds, annual runoff and rainfall are nearly balanced. Knowing that they are in balance and being able to calculate any change in the balance for a year is the key to predictions.

Usually, annual water-year records have arbitrarily been started in the fall when soil moisture is lowest. But studies of actual soil moisture date over 12 years at the ARS Water Hydrology Station, Coshocton, Ohio, showed that moisture level at most times of the year is variable from year to year. They showed, however, minimum year-to-year variation in spring ground moisture compared with the larger fall change.

This comparison illustrates the disadvantages caused by the variable fall level. That is, analysis of annual records based on the fall starting time would need to account for large variations in ground storage at the beginning and end of the water year, before the runoff-rainfall balance could be calculated. Such accounting would be impractical in most watersheds, for it could be made only with actual soil moisture data.

To prove spring rainfall and runoff data reliable in calculating water balance at Coshocton, ARS hydrologist K. L. Brakensiek tested various water years starting in different months. Ground moisture was most stable in years starting March 15, when soil moisture is greatest. At Coshocton, this technique was practically equivalent to using detailed soil moisture data. The average change measured a fraction of an inch.

From data on seven other watersheds in Nebraska, Texas, Missouri, and Illinois, Brakensiek found that the optimum start varied from April to June, depending on when ground moisture was highest. These watersheds are in areas where rainfall and runoff are highly correlated.

By proving the balanced relationship between annual rainfall and annual runoff in many small agricultural watersheds, Brakensiek demonstrated the optimum water year's usefulness for predicting runoff. This concept is not only useful in predicting runoff for small sheds, but also adds to the competence of all water specialists for overall watershed planning.

AUDIO-VISUAL ITEMS

Your Valley—Your Future was the first film produced by the Connecticut River Watershed Council, P.O. Box 89, Greenfield, Mass. This 29 minute, 16 mm. color and sound (narrated by Lowell Thomas) film shows in a general way the natural resources problems in the Connecticut Valley. A second film, **The Wonderful Valley** (30 min., color and sound, 16 mm.) outlines the flood-control problems. For further information on use of these films, write the Council. Both films have been shown widely throughout the Northeast and elsewhere and have been well-received.

Conservationists responsible for youth programs, especially in organized and school camping, will be interested in seeing the new 16 mm. sound and color film, **Adventuring in Conservation.** This 14½ minute film was made by the cooperation of the American Camping Association and the Lilly Endowment, Inc. Preview or purchase copies can be obtained from the Audio-Visual Center, Indiana University, Bloomington, Ind.

The film will have most value in the training of counselors so that more conservation topics and activities are related to organized youth camp programs.

SLIDE SET ON FERTILIZER PLACEMENT

Proper placement of fertilizer is beginning to rank with proper amounts in the minds of today's farmers. Many agronomists believe improper placement has been limiting fertilizer use. Two main objectives of safe, efficient placement are: (1) to avoid injury to seedlings, and (2) to provide efficient use of nutrients from start to maturity.

A set of 40 color slides, accompanied by script for educational use, is now being distributed by the American Potash Institute, 1102 16th St., N. W., Washington 6, D. C.

Soil

Soils of South Dakota. By Fred C. Westin, Leo F. Puhr, and George J. Buntley. 34 pp., illus., references, appendices. 1959. Soil Survey Series No. 3, Agronomy Department, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak. (No price given.)

This publication describes the characteristics, qualities and problems of the soils recognized to date in South Dakota. It and the accompanying maps are primarily for educational purposes. The appendices include Progress of Soil Surveys in South Dakota; Soils on Experimental Fields; Soil Keys; and Definition of Terms.

The six chapters cover major soil regions, soil forming factors, soil formation, morphology, and classification, soil groups, soil associations, and interpretation.

An attractive, useful and well printed booklet, 8½ by 11 inches in size.

Living Earth. By Peter Farb. 178 pp., illus., refs., index. 1959. Harper & Brothers, Pub., 49 East 33rd St., New York 16, New York. $3.75. (Reviewed by Stanley B. Mulaik, University of Utah, Salt Lake City.)

This book brings a deserving focus upon the biological character of soil. The vast numbers of organisms which in some cases amount to billions to the ounce, are among the conditioners of the soil out of which man draws his agricultural wealth.

The author, a professional writer, has brought together a rich store of information about how organisms carry on their varied activities. In the first chapter he reviews some of the earlier beliefs such as that of spontaneous generation, and also the more recent studies. He presents most dramatically how competition and cooperation in many cases are "fantastic in their intimacy".

While there have been many studies of the soil as a living earth, Peter Farb brings a new and highly readable style to portray the real character of the earth on which man relies for his food, much of his fiber and other organic products. The book is divided into five parts with ten intriguing chapters: *The Placenta of Life; Story of Soil; The Forest Hive; The World of the Root; Soil Societies; The Grassland; The Dwellers in Darkness; Triumph of the Seed; The Deserts; Living Together-Living Apart;* and *This Enduring Earth.*

A careful reading of this book is recommended for anyone who in any way deals with soil and its relation to our culture and heritage. "There can be no life without soil, and no soil without life—they are inseparable."

Abstracts of Recent Published Material on Soil and Water Conservation. 61 pp. USDA, ARS 41-30. 1959. U. S. Govt. Printing Office, Washington 25, D. C.

The Abstracts are issued at irregular intervals and bring together a summary of current published information about soil and water conservation. Distribution is handled by the Soil Conservation Service, the Agr. Research Service, and cooperating agencies and institutions for their own personnel. This issue is the 15th under this title. Most of the issues are no longer available, except in certain libraries.

Proceedings, 13th Annual Convention of the National Association of Soil Conservation Districts, Houston, Texas, February 1-5, 1959. 42 pp., illus. (1959). Service Dept., NASCD, League City, Texas. (Price listed: "Additional copies," $3.00.)

Hawaii Reports

Improving Hawaiian Soil Resources. Anonymous. 46 pp., illus. 1958. USDA, SCS, Honolulu, Hawaii.

Looking at Soil and Water Conservation in Hawaii. Anonymous. Not paged, 8 maps. 1957.

Soil and Water Conservation in Hawaii. USDA, SCS. 8 pp., illus. 1957.

Working Together in Hawaii. Anon. 9 pp., illus. 1957. (The story of 8 district members.)

These four publications enable a person not familiar with soil and water conservation problems and activities in Hawaii to obtain a broad vista of the problems and solutions now underway.

Water

Technology in American Water Development. By Edward A. Ackerman and George O. G. Löf. 710 pp., illus., glossary, folded map inside back cover. 1959. The Johns Hopkins Press, Baltimore, Md. for Resources for the Future, Inc. $10.00. (Reviewed by Wallace E. Akin, Drake University, Des Moines, Iowa).

This volume is a valuable addition to the impressive and growing list of publications by Resources for the Future in the fields of water resources, energy and mineral resources, land use and management, regional studies, and resources and national growth. The authors present varied backgrounds in the field of water resources. Edward A. Ackerman was Director of Water Resources for Resources for the Future, Inc. until the fall of 1958, and is now Deputy Executive Officer for the Carnegie Institution of Washington. Dr. Ackerman has held a number of positions in the resources field including those of Assistant General Manager, Tennessee Valley Authority and Professor of Geography at the University of Chicago. George O. G. Löf is a chemical engineer and expert on solar energy and is a consultant to the Office of Saline Water, Department of Interior, and a part-time member of the research staffs of the University of Wisconsin and Resources for the Future.

With the growing realization that water resources, even in humid regions, are limited, it is becoming evident that technology must hold the answer to the problem of meeting increasing demands on the water supply by making available techniques for conserving water and thereby increasing the supply, by reducing the requirement of water for specific uses and thereby reducing demands, and by protecting and improving quality of water in order that more water will be available, and to facilitate multiple use of the supply. Parallel to the purely technical aspects of expanding our usable supply of water, social and economic forces must be brought into play to make technology effective, and technological advances in turn often pose new problems for the administrator. This study deals with all of these aspects of an expanding technology in water development and does a thorough job of fulfilling the objectives as set forth

by the authors in their introduction; namely, to give "(1) a review of the past technical changes important in water development, and the construction of a meaningful classification of such technical events; (2) appraisal of the socially and economically relevant technical subjects suitable for more detailed study; and (3) appraisal of the manner of studying the relation between technology and the administration of water development in the United States".

Part I of the study is concerned with the physical and economic environment of water development. A chapter is devoted to an excellent summary of the geographical nature of water occurrence, particularly in the United States, and is followed by a chapter on the nature of water use in this country in which uses are given a threefold classification; namely, *withdrawal use* including disappearing withdrawals and returnable withdrawals; *flow uses* which depend on water in motion, *i.e.* hydro power production, waste disposal, some fisheries, and some types of recreation; and *on-site uses* where little flow is involved, as in lakes. Each use type is analyzed in some detail and numerous statistics are included. The concluding chapter of Part I considers the problems and opportunities presented to technical achievement in matching water supply to water demand, including problems of timing to minimize the adverse effects of fluctuations of supply, and problems of quality and quantity. An interesting table in this chapter summarizes the water uses which have been competitive in the past or which may be competitive in the future.

Part II deals with techniques and technical events significant in the progress of water resources development. The authors, wisely, have not attempted an exhaustive treatment of all technical developments relating to water resources, but rather have attempted a general classification of techniques and technical events into those affecting water development and its administration, techniques increasing the demand on water supply, techniques capable of decreasing water demand, methods of extending services afforded by a given unit of water, technical improvements promoting the sale economies (equipment, materials, design and operation), and techniques extending the physical range of water recovery. Specific cases are selected to illustrate each of the above topics.

Part III is concerned with the new technology which is emerging at a rapid rate. Many of these technical developments as yet have had little impact on the water resources, but their potential effect is large. Included in this section is an analysis of the role of hydro power vs. thermal generation of electricity. The authors visualize an increasing utilization of thermal generating capacity to carry the base load while hydro will more and more be utilized to carry the peak loads since costs of operating hydro establishments at less than capacity are considerably less than for thermal plants. The potential impact of atomic energy is considered along with the new problems brought about by the nature of atomic wastes and disposal. The potentials of weather modification, use of saline waters, physical expansion of the range of recovery of ground water, and techniques extending the use of a given supply through improvements in agricultural and industrial techniques are considered.

The final section of the book, and in many ways the most significant, is a consideration of the organizational responses to problems and opportunities for water development introduced by our changing technology. The authors conclude that we are in the midst of an evolution in the administrative structure of water development, the pattern of which is not yet clear. At present, some needs have been met very well, some adequately, some partly, and others not at all.

Although the authors presuppose no vast technical knowledge for the reader, the book is far from a popularization of the subject, but rather is a scholarly treatment concerned with the organization of our thinking on the subject of technology and its impact on water resources. With this in mind, a considerable part of the book is devoted to analysis and classification of technical events and administrative responses or lack of response to them. Although primarily concerned with the United States, a large portion of the book is applicable to any part of the world where emerging technology is creating as well as solving problems of water development and administration. This is a book for those seriously concerned with water resources development.

Ground Water Hydrology. By David K. Todd. 336 pp., illus., references, index. 1959. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $10.75. (Reviewed by Edward A. Johnson, Columbus, Ohio.)

During the past twenty years there has developed an increasing interest in ground water hydrology. Along with this interest has come a continuously growing search for knowledge and the publication of research results in a more and more complex list of bulletins and articles. This has meant that in recent years civil, agricultural, and irrigation engineers, forestry, mining, and public health personnel looking for information on ground water have encountered obstacles because of the number and variety of possible sources.

This new book listing over 700 of the more important references brings together a large source of information in one place. This book meets the present demand for a unified, comprehensive account of the fundamentals and recent methods and problems encountered in the field of ground water hydrology. With its authentic and well-organized technical information it will be an extremely useful manual for teachers, graduate students, research workers and a practical handbook for personnel in charge of irrigation, municipal and industrial water supplies and watershed management.

Readers will find many well conceived graphs, tables, and illustrations employed to point out fundamental principles, methods and problems in ground water hydrology.

This 14-chapter publication is by no means an elementary text nor a source of popular information since it presupposes a background knowledge of soils, mathematics, geology and fluid mechanics.

The author begins his book with a set of definitions and a short statement of how ground water hydrology relates to geology, hydrology, and fluid mechanics. He clarifies the subject to be covered by separating it from fluid systems important in petroleum engineering. Following this introduction the growth of interest in ground water is discussed. The author points out that during the 18th century fundamentals in geology were established which provided a basis for understanding the occurrence and movement of water.

As an important step in developing his subject, Dr. Todd devotes the first six chapters to the physical side of ground water hydrology. Beginning with the occurrence of ground water, he discusses properties affecting ground water, type of aquifers, ground water in permafrost regions, and ground water in the United States. He proceeds to *Ground Water Movement*. Soil conservationists should find this very interesting since it incorporates new concepts and methods for field measurement of permeability, tracing ground water movement and flow equations. Then the author discusses well hydraulics. He explains this section in a simple manner so the reader can see the purpose of the calculations and how they are used in the practical solution of well flow problems. In the chapter *Ground Water Level and Fluctuations* the author

begins to deal with the influence of seasonal variation, atmospheric pressures, and vegetation. Even though the text is purposely concentrated on the physical side of hydrology, soil and water conservationists will feel that it might have been desirable to devote more space on fluctuations due to evapotranspiration and the really important effects of vegetation.

The chapter *Quality of Ground Water* includes statements regarding standard methods for reporting physical, chemical, and bacteriological constitutents.

The next four chapters show how a knowledge of the factors previously discussed are applied in conservation of ground water supplies, where ground water occurs, and in artificially recharging ground water. Watershed researchers will be interested in the discussion on the electrical resistivity and seismic refraction methods in locating and analyzing ground water.

The last three chapters deal with sea water intrusion in coastal aquifers, legal aspects of ground water, and a review of the various types of laboratory model and numerical analysis studies which are valuable ground water research tools.

It would have been helpful if space had been used in presenting special adaptation of statistics to ground water hydrology. The utility of modern experimental design should be covered briefly as well as value of statistical control by such means as regression, correlation and covariance analysis.

The preparation of this thorough text must have been a herculean task and every chapter shows evidence of careful and painstaking thought and study of available knowledge. Ground water hydrology is a difficult subject to write about. Dr. Todd is to be highly congratulated for this volume in which the fundamental considerations of ground water as a water supply source are presented in understandable terms.

Snow Surveyors. By C. B. Colby. 48 pp., illus., index. 1959. Coward-McCann, Inc., 210 Madison Ave., New York 16, N. Y. $2.00. (Reviewed by Homer J. Stockwell, Portland, Oregon.)

This book relates by pictures and appropriate descriptive material the snow survey and water supply forecast prgram of the Soil Conservation Service and its cooperators in western states. It emphasizes field operations of the snow surveyors, the men who go into the mountains to measure the snowpacks during the winter months. Illustrations include proper use of winter clothing for long exposure to severe climate, foot and motorized over-snow travel, special cabins and emergency survival shelters, safety in the snow, the tools used, and the technique of snow and related measurements. The history and economic use of snow surveys is reviewed in a brief preface.

The book is the latest in a series of popular books by Mr. Colby on unusual facets of American life planned to interest the general public.

Our Growing Water Problems. By R. G. Lynch. 61 pp., 1959. National Wildlife Federation, 232 Carroll St., N.W., Washington 12, D. C. Single copy free; write to Federation for free copy and prices on quantity purchases.

Writer Lynch is a noted newspaper reporter for *The Milwaukee Journal* and assigned since 1956 strictly to reporting on conservation, and related matters. Lynch has been productive and his publications have covered many aspects of land and water use. More recently (1958) he prepared a series of articles on Alaska. His reporting, although written for popular consumption, is objective.

Our Growing Water Problems is probably one of the better and most complete popular reports to date on the subject, although the "Model" water law should have been included and printed as an appendix. This booklet is worthy of widespread study—especially by persons, agencies and organizations concerned with water and land resources.

Lynch is a member of SCSA and active in the Wisconsin chapter.

Water Street U. S. A.—The Watershed Exposition of the Arizona-Sonora Desert Museum. By William H. Carr. 65 pp., illus. Educ. Series, No. 3, May 1959. A Joint Publication of the Arizona-Sonora Desert Museum (Tucson, Ariz.) and the Charles Lathrop Pack Forestry Foundation. Price for single copy, 75c

As an "efficient means of thought communication and stimulation," *Water Street U.S.A.* will be hard to beat. This permanent, exposition-tour grounds and display at Arizona-Sonora Desert Museum near Tucson is probably the best of its kind anywhere in the world.

There is demonstrated many facts and influences of water upon land and life, including human beings, through the use of many ingenious devices involving all the senses. Although one really has to visit the exposition to appreciate more fully the tremendous interpretive job that has been accomplished, one can get a fair idea of what *Water Street, U. S. A.* is by reading the booklet and studying the excellent illustrations.

The interpretive arts of many skilled persons, as well as agencies and organizations, went into the preparation of the exposition, which was dedicated October 28, 1958, during the 83rd annual meeting of the American Forestry Association. Since then, the display has received world-wide acclaim.

"We have tried to make the facts fascinating," stated Director Carr, "because that is exactly what they are; essential facts about rainfall, drought, evaporation, infiltration; facts about what water *'does'* and what is *'done'* to it."

The exposition and the descriptive booklet are indeed worthy of intensive study, highest acclaim, and many top awards of merit.

Water Requirements in the Muskingum River Basin in 1975. By the Dept. of Conservation, School of Natural Resources, University of Michigan. Prepared by Lyle E. Craine. 51 pp., 10 tables, special appendices. 1957. Dept. of Conservation, School of Natural Resources, University of Michigan, Ann Arbor, Michigan. (No price given.)

There is much evidence that Ohio, among the states, has one of the more progressive programs in analyzing water needs and water management. The Muskingum Watershed Conservancy District has served well as a source of much information and analyses. Here is a "planning" report directed to the District, although the report also serves as a "pilot study" for regional water requirements.

Evaluation of Agricultural Hydrology by Monolith Lysimeters 1944-55. By L. L. Harrold and F. R. Dreibelbis. 166 pp., 33 tables, 43 illus., bibliog., appendix. USDA Tech. Bul. No. 1179. 1958. U. S. Govt. Printing Office, Washington 25, D. C. 55c

A progress report on investigations carried on at the Soil and Water Conservation Research Station near Coshocton, Ohio, from 1944 through 1955.

Sprinkler Irrigation. By Guy Woodward (Editor). 400 pp., illus., (2nd Ed.) Sprinkler Irrigation Association, 1028 Connecticut Ave., N.W., Washington 6, D. C. $8.50 ($9, foreign countries).

An up to date edition of a publication that received world-wide distribution.

Water Yield and Reservoir Storage in the United States. By Walter Langbein. U. S. Geological Survey Circular 409. 1959.

Probability Analysis Applied to a Water-Supply Problem. By Luna B. Leopold. U. S. Geol. Surv. Circ. 410. 1959.

Copies of these two provocative publications can be obtained free from the U. S. Geological Survey, Washington 25, D. C.

Using probability mathematics, Geol. Surv. hydrologists concluded "there is a limit to the practical gains which can be accomplished by building reservoirs on streams, and that limit already may have been reached if not exceeded in some of the western drainage basins." Current regulated use on reservoir storage amounts to about 190 million acre-feet of water. This is about 13 per cent of the total U. S. river flow, Langein reports that by 1985 or 1990 the U. S. will need about double this amount of storage—a real challenge of ingenuity in achieving efficient location of added storage.

Both publications warrant careful study, especially in view of anticipated needs in western areas.

Economic Analysis of Water Resource Development Projects. From the October, 1958, *Monthly Review*, Research Department, Federal Reserve Bank of Kansas City, Kansas City 6, Missouri. Pp. 9-16.

Points out the lack in means of measuring accurately the general impact of development projects upon the economy. Large areas of unresolved factual issues result "because the ability to gauge the full ramifications of resources development projects is severely circumscribed by limited economic knowledge."

Pilot Watershed Project Points the Way. South Carolina Soil Conservation Committee. 8 pp., illus. (Not dated; 1959?) Copies can be obtained from the Committee, 424 Calhoun Office Bldg., Columbia, S. C. No charge.

This modest booklet is very effective. It is done through 8 photographs, brief statements of facts about the watershed, answers to most frequently asked questions, and statements on "Will It Pay?" and "How Can You Share in Watershed Benefits?" Undoubtedly the "educational" impact on the average reader will be great, since the booklet can be examined and read in less than five minutes.

Development of literature to communicate the facts of conservation to the general public is constantly in need of critical examination and research. This South Carolina publication might well serve as a model or norm.

The Wetland Story. By Charles H. W. Foster. 16 pp., illus. 1959. Massachusetts Audubon Society, 155 Newbury St., Boston 16, Mass. 25c

The author, Commissioner of the Massachusetts Department of Natural Resources, has prepared a well-written, worthwhile and straight-forward account of wetlands in the U. S., with emphasis on the wetlands of Massachusetts. Massachusetts has had an active inter-agency "wetland committee" since 1955.

Salt Tolerance of Grasses and Forage Legumes. By Leon Bernstein. 7 pp., illus., USDA Agr. Inf. Bul. No. 194. 1958. U. S. Govt. Printing Office, Washington 25, D. C. 5c

Salt tolerance is the degree to which a crop can produce a satisfactory yield on salty land. Plants and treatments are described briefly.

Drouth, A Report on Drouth in the Great Plains and Southwest. Prepared under the direction of the Special Assistant to the President for Public Works Planning. 45 pp., illus., 13 charts. 1958. For sale by U. S. Government Printing Office, Washington 25, D. C. 35c

"What has been outlined . . . is a brief history of the causes and effects of drouth. There also has been described a way in which the peoples of the region may attack the problem and develop long-range courses of action to ameliorate the effects of the natural phenomena with which they must live."

Grasslands

Grasslands: A Symposium Presented at the New York Meeting of the American Association for the Advancement of Science, December 27-30, 1956. Edited by Howard B. Sprague. 406 pp., illus., index. Publ: No. 53. 1959. AAAS, 1515 Massachusetts Ave. N.W., Washington 5, D. C. $9.00 ($8.00, prepaid to AAAS members).

The published results of the 1956 program of Section O (Agriculture) of the AAAS annual meeting, December 27-30, in New York City. Research, forage production, engineering, forage utilization and nutrition problems, nutritive significance of forages, climatology, ecology, and range management are the general topics covered by 37 papers prepared by 44 authors and with a preface by H. B. Sprague.

Pitting for Range Improvement in the Great Plains and the Southwest Desert Regions. By Oscar K. Barnes, Darwin Anderson and Arnold Heerwagen. USDA Prod. Res. Rept. No. 23. 17 pp., illus. 1958. U. S. Govt. Printing Office, Washington 25, D. C. 10c

Seasonal Development and Yield of Native Plants on the Upper Snake River Plains and Their Relation to Certain Climatic Factors. By James P. Blaisdell. 68 pp., illus., 24 tables, 15 figures. Tech. Bul. No. 1190, USDA. 1958. U. S. Govt. Printing Office, Washington 25, D. C. (No price listed.)

An important study by the Forest Service in eastern Idaho from 1932-54. Should have application to grazing dates, as well as better understanding of certain climatic factors, especially precipitation, and relationships to grasses, forbs and shrubs included in study areas.

Prairie Farm Rehabilitation and Related Activities 1957 - 1958. 93 pp., illus., 8 appendices. 1958. Canada Dept. of Agriculture, Prairie Farm Rehabilitation Branch, Regina, Saskatchewan, Canada. (No price listed.)

The Prairie Farm Rehabilitation Act was passed in 1935 to provide for rehabilitation of the drouth and soil drifting areas in Manitoba, Saskatchewan and Alberta. The Act was amended in 1937 to include land utilization and settlement. Operations of the program cover about 105 million acres, including several large irrigation and reclamation projects outside the boundaries of PFRA. An informative report, but with restricted distribution.

Forestry

Forest Influences. By Aldo Pavari. *Unasylva*, Vol. 13, No. 1, 1959, pp. 12-23. (Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y. 65c a copy.)

A reassessment of current thinking on the influence of forests on their environment is being undertaken by FAO, particularly in connection with the Mediterranean development project. Influences on climate, soil and water are discussed. An important article.

The National Forests. By Arthur H. Carhart. 289 pp., illus., list of forests, index. 1959. Alfred A. Knopf Publisher, 501 Madison Ave., New York 22, N. Y. $4.75

Written in a lively manner and with attention uniquely to the geology of forest lands, this is an interpretive book, especially for travelers who will wish to gain a greater understanding of the multiple values of national forest lands. Forest-fire control, watershed control, soil management, wildlife management, pest control, timber production, wilderness protection, and recreational facilities are woven into the text by anecdote and impression. A worthwhile introduction to the national forests.

Forest Fire: Control and Use. By Kenneth P. Davis. (Chapters 3 and 4 by George M. Byram and Chapter 5 by W. R. Krumm.) 584 pp., illus., bibliographies by chapters, index. 1959. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. $12.00.

The American Forestry Series of the McGraw-Hill Book Company now totals 26 volumes. Dr. Davis, the author of the "fire" volume, is a professor of forestry at the University of Michigan. With the universally stepped-up program on forest fire prevention and control, as well as "use" of fire under special conditions, this book will serve to bring most readers up-to-date. Treatment centers on the U. S. but is applicable to Canada. The book is intended as a college text, but will be of much use to the field man and the general reader. Here is a valuable book that is realistic and practical. Case histories are used to illustrate wildfire control and prescribed burning.

The Perpetual Forest. By W. B. Collins. 288 pp., lists of animals and plants, bibliog., index. 1959. J. B. Lippincott Company, East Washington Square, Philadelphia, Penna. $4.50.

For the person who wishes to explore literature relative to the conservation of natural resources in other lands, this book will be a very readable and satisfying introduction to "closed" tropical forests of the Gold Coast of Africa. The author is Deputy Chief Conservator of Forests, Ghana. The destruction of the closed forests in parts of Africa has proceeded at an appalling and unplanned rate. Apparently "land capability" systems are unknown or non-existent. Before the best (least-destructive) land-use practices will be applied, a tremendous amount of research and education is needed.

The Tree Identification Book. By George W. D. Symonds, with photographs by Stephen V. Chelminski. 272 pp., over 1,500 illus., index. 1958. M. Barrows and Company, Inc., 425 Fourth Ave., New York 16, N. Y. $10.00.

A beautifully conceived, designed and-intriguing book that will aid beginners and experts in acquiring a practical and year-round (any season) method for the practical identification and "recognition" of over 130 trees.

The techniques developed by the authors are refreshing and might be adapted to identification and recognition in other fields, e.g., soils, land forms, ecosystems, and land use. "Recognition" has special application—we have learned to "recognize" certain people, for instance, only after mastery of certain identifying details. This book leads the reader through the "photographed details" of trees in all seasons and aspects so that "recognition" at any time of the year becomes the goal.

Economics of American Forestry. By Albert C. Worrell. 441 pp., tables and graphs, index. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1959. $9.75.

Although here is primarily a text for a college course in the economics of forestry, any person interested in the economics of natural resources will find it most rewarding. An excellent book.

Ecology

Marine Ecology. By Hilary B. Moore. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 493 pp., illus., Appendix: Genera referred to in the text, references, index. 1958. $9.50.

John Wiley & Sons, Inc., is a leader in the publication of books dealing with ecology and applied ecology (management of natural resources). The science of ecology "embraces all aspects of the interrelations of organisms and their environment, and since the organisms themselves are part of the environment, their own interrelations form part of the study." Conservationists, it seems, must ever be searching the literature of ecology for a boiling down of principles and applications for further research and manipulation of populations and biotic communities. It is primarily for this reason that this new book by the assistant director of the Marine Laboratory of the University of Miami is called to attention of readers who have been devoted largely to non-marine ecology and conservation

WATER FACTS FOR THE NATION'S FUTURE

Walter B. Langbein, U. S. Geological Survey; and William G. Hoyt, formerly U. S. Department of the Interior

This timely new book offers an authoritative study of existing federal and state hydrologic programs for collecting, interpreting, and publishing water data. Giving practical recommendations for future expansion and improvements, it outlines specific steps which must be taken if these programs are to furnish the information indispensable for intelligent management of our water resources. Many original suggestions are presented, particularly for improving the design of hydrologic networks. *A Conservation Foundation Study. 41 illus., tables; 288 pp.* $5.00

Also sponsored by The Conservation Foundation:

Vegetation and Watershed Management, Colman $7.50
The Flood Control Controversy, Leopold-Maddock $5.00
The Law of Water Allocation in the Eastern United States, Haber-Bergen $7.50
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AMERICA'S NATURAL RESOURCES

Edited by a Committee headed by Charles H. Callison, National Wildlife Federation

A factual survey of our natural resources, their interdependence, and conservation. Book brings together basic information about soil, water, grasslands, forests, and each of the major renewable resources. Each topic is covered by a leading authority who clearly details the historical background, points out the importance of the resource to human life, shows the dangers threatening it, and explains sound methods for preserving and using it most profitably. *"A clear, compact, and sound discussion."*—American Scientist. *Edited for the Natural Resources Council of America. 211 pp.* $4.00

FOREST SOILS

S. A. Wilde, University of Wisconsin

Interpreting the theoretical and practical relationships between good forest management and soil properties, this book considers the soil as a major implement of silviculture. Correlates the physics, chemistry, and biology of soils with important features of forest stands—their composition, rate of growth, stability against adverse climatic and biotic factors. Provides working knowledge needed for the successful growing of nursery stock, tree planting, soil improvement, etc. *"The most modern, comprehensive treatment available."* —American Forests. *216 illus., tables; 537 pp.* $8.50

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2. ENVIRONMENTAL CONSERVATION

By RAYMOND F. DASMANN, *Division of Natural Resources, Humboldt State College.* Takes the ecological approach, stressing the need for conservation of complete environments. This is the long view, which considers the history of human populations in relation to natural resources, the present condition of these resources, and the outlook for the future. Emphasis throughout is on *accuracy*, presented in a readable framework. 1959. 307 pages. $6.50.

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(applied ecology). One can often be lifted out of the so-called "narrowness of specialization" by spending some time in reading or investigation in allied fields. At least, we can remind ourselves that much marine shorelife is affected by land management and drainage from terrestrial uplands. In fact, in Dr. Moore's own backyard, Florida, there are many marine shorelife problems that have been emphasized by land-use and misuse adjustments.

Quantitative Plant Ecology. By P. Greig-Smith. Academic Press Inc., 125 E. 23rd. St., New York 10, N. Y. 198 pp., illus. 1957. $6.00. (Reviewed by Ben Osborn, Washington, D. C.)

As the science of plant ecology plants its feet ever more firmly on the ground of measured data and recorded observation, the theory of quantitative analysis becomes increasingly important to the researcher and field technician. This thin volume from a lecturer in botany at the University of North Wales examines the applications of mathematical and statistical theory to important problems of plant ecology.

This is not a manual of field technique. It does not describe the mechanics of such things as marking plots, charting quadrats, and measuring basal area. Rather, it considers the questions of how many plots are needed, whether they should be round, square, or oblong, and whether they should be located in a purely random fashion or according to a systematic pattern.

The six major chapters deal with six classes of problems in the study of vegetation: (1) quantitative description of vegetation, (2) sampling and comparison, (3) pattern, (4) association between species, (5) correlation of vegetation with habitat factors, and (6) plant communities.

The seventh and final chapter assesses the quantitative approach to plant ecology. Here the author warns against the "tendency either to apply quantitative methods too enthusiastically, or to apply them to problems to which they are not, or not yet, appropriate." Qualitative investigation has a place in the study of a problem, as in the development of a science as a whole, to provide an understanding of the broad aspects of the subject. Quantitative techniques then can bring out the finer details of the matter and place the science on a more exact basis.

Plant technologists in the conservation field will find that much of the discussion is pertinent to their problems of measuring and evaluating vegetation on croplands, grasslands, woodlands, and wildlife habitats. The book deals with basic principles involved in the practical as well as theoretical aspects of plant science.

Report on India's Food Crisis and Steps to Meet It. By the Agricultural Production Team (Sherman E. Johnson, chairman). 259 pp., biogr. notes on team members. 1959. Issued by the Government of India, Ministry of Food and Agriculture and Ministry of Community Development and Cooperation, Delhi, India. Price Rs, 75 NP. *(Americans interested in possibility of obtaining a copy of this report should write to the Embassy of India in Washington, D. C. Distribution outside of India is apparently very limited.)*

With the support of the Ford Foundation—a most commendable and humanitarian move, a 13-man team from the USA spent about two months in India. There were 12 supporting members from India and 3 special assistants from the Ford Foundation. (It is noteworthy that three SCSA members were on the team: Marvin Anderson, Ames, Iowa; Omer J. Kelley, Fort Collins, Colo.; and Charles E. Kellogg, Washington, D. C.)

The magnitude of food production problems in India is impressive. Technical descriptions of the main food production are set forth in the report, which was prepared by the team. There are no simple solutions. The facts and analyses which lie behind the team's conclusions are found in the body of the report.

Certain major proposals stood out: A target plan to be attained by 1965; to close the impending gap behind supplies of food and "target"—rate of increase of food has to be tripled; need for emergency action; stabilization of farm prices; a public works program to increase food production and village employment; priorities for chemical fertilizers; intensified irrigation and drainage programs; selection of certain crops and certain areas for more intensive efforts; security of land tenure and land consolidation; large-scale credit through cooperatives; progressive reduction and improved use of cattle; urgency of a high-level coordinating food production authority; community development and the technical ministries; and India's capacity to do the job.

The Team approached its job and the preparation of the report with great humility. Scarcely had the Team left India, when the report was printed, distributed and studied in India. It is indeed a most important report. India's problems are the world's problems.

News Notes

PRESIDENT'S COLUMN

DURING 1959 GREAT STRIDES have been made in going forward with the objectives of the Soil Conservation Society of America. The particular goals for 1959, printed on the back of my letter to the members last May and published in the JOURNAL (Jan. 1959, p. 42), have been achieved. In some respects, we did better than we had hoped and in others there were deficiencies. On the whole, it has been a year of good progress.

The new By-laws were put into effect. The Development Fund Board called for in these By-laws was created and activated. It has a going program. Canada is well represented by N. R. Richards, the new Councilman from that region.

This year's annual meeting was a huge success with more than 2,000 people registered. The world's first soil and water conservation commemorative stamp issued by our Post Office Department and released at this annual meeting exceeded all expectations. Hugh Bennett, now about 80 years of age, attended this meeting, had a wonderful time, was honored by the Society in the best way we could, and gave a great talk before some 1,500 assembled people.

Most of our 30 committees have done exceptionally good work this year. A statement prepared and released by the Committee on Public Policy was approved by the Council, read at the annual meeting, and is published elsewhere in these pages. The Awards program of the Society this year was the most outstanding we have had. The Wetlands Classification Committee, the Water Resources Management Committee, and the Land Utilization Committee have all made important technical contributions this year. Space in this column does not permit me to review the progress which each of our committees has made.

Chapters have grown in size and stature and now number 112.

The book **Dennis the Menace and Dirt** has been released and we now have in the mill a technical proceedings on snow surveys. It is expected this will be published soon. Sale and distribution of our popular soil and water conservation booklets has continued to be good.

I feel the Society fell down this year in not sponsoring more soil-water-and-related-land-resources seminars, technical papers for publication, and monographs. There is much material available for monographs but we just did not select it and take advantage of all the opportunities.

Membership has grown steadily, and we owe our thanks to George Winchester, his committee, and all the chapters that worked on this project. Membership is now over 10,000.

Our student chapters have done very well but we need more of them.

The decision was made this year to hold the 1962 annual meeting of the Society in Washington, D. C. This is the year the Department of Agriculture will be celebrating its centennial. Next year's meeting will be in Canada at the Ontario Agricultural College, Guelph, Ontario, and the 1961 meeting is scheduled to be held at Purdue University, Lafayette, Indiana.

The 7th National Watershed Congress, which the SCSA sponsors with some 20 other societies and organizations, will be held in Washington, D. C., on April 18-20, 1960. One of the features at this meeting will be the release of a water conservation commemorative stamp by the Post Office Department. An attractive program is being arranged, and I hope for a good attendance by SCSA members.

You have already read about inauguration this year by our Development Fund Board of the SCSA Building Fund campaign. Dr. Bear, Chairman of this Board, has written to all chapter officers about this important project. We are going to build our own SCSA office and headquarters building in Des Moines, Iowa. Building sites are now under consideration. The Council hopes to make a decision with respect to a site no later than March, and our general plans call for starting construction no later than January 1, 1961. This is an exciting and worth-while project with which every member should be concerned. It is a project we will be very proud of—we are "building for the future" as well as the current needs of the Society and the soil conservation movement.

In closing let me urge each and every member, and each and every chapter, to do all possible by helping to raise funds to make our own building a reality soon.
—ALVIN C. WATSON, *President*.

DEVELOPMENT FUND BOARD REPORTS

Federal, state, and local governments appropriate large funds in support of the conservation of one or more of our renewable natural resources. But there are some things that can best be taken care of by societies, individuals, foundations, industrial agencies and other groups, which have a special interest in one or another phase of the subject.

The Soil Conservation Society of America is concerned with the conservation of *all* our renewable natural resources—soil, water, forests, grasslands, crops, livestock, fish, and wildlife—to the end that they serve the needs of man ever more effectively in perpetuity. The SCSA brings its 10,000 members together in national, state, and local meetings to consider national, state, and local problems in *all* these fields of study and action. It publishes the JOURNAL OF SOIL AND WATER CONSERVATION on a bimonthly basis. And it lends its support to all worthwhile conservation efforts.

Many highly important needs for funds to carry out particular projects related to the *total conservation effort* are brought to the Society's attention. The Society would like to support some of these projects but its membership dues and such other income as it has are used up in its regular activities. The Society decided, therefore, to appoint a Development Fund Board that would study the *extra* activities with which the members of the Society feel they should concern themselves and make recommendations concerning these. The Development Fund Board consists of Howard E. Barrows, Firman E. Bear, C. R. Henry, Russell G. Hill, H. Wayne Pritchard, and E. H. Taylor.

In accord with this assignment, the members of the Board have reviewed the many special proposals that have been made to the Society for furthering the cause of conservation.

Ten projects impress the Board as having particular merit for financial support by members of the Society and by such other individuals, groups, foundations, and other agencies as are concerned with the general field of conservation. These projects as outlined are:

No. 1—Headquarters Building for SCSA. A grant of $20,000 annually for a

period of 5 years to the SCSA to permit it to finance the construction of a building to house its employees and their operations. The executive secretary of the Society is required to develop the necessary plans and specifications for such a building under the direction of the Council and subject to its approval.

No. 2—Monthly Journal. A grant of $12,000 to be awarded to the Soil Conservation Society of America for one year, and renewable on a yearly basis for five years at a reduction of $2,000 per annum, to permit of changing the publication of the JOURNAL OF SOIL AND WATER CONSERVATION from the present bimonthly basis to a monthly basis.

No. 3—Scholarships. An undergraduate scholarship in conservation paying not less than $1,000 per year and renewable annually to be awarded to some highly capable high school or preparatory school graduate or to some college freshman or sophomore who desires to prepare himself for some particular phase of conservation work in line with his special interests. Each applicant for this scholarship is required to submit a statement of his training and experience, a transcript of his high school, preparatory school or college record, a letter of recommendation from his school principal or professor, a letter of recommendation from some person associated with the conservation movement in a specific capacity, an outline of the subjects to be studied, and a letter of acceptance or approval from the college or university in which he proposes to enroll or is enrolled.

No. 4—Graduate Fellowships. A graduate fellowship in conservation, paying $2,500 per year and renewable annually, to be awarded to some highly capable person with a B.Sc. or M.Sc. degree who desires to continue with graduate work to the Ph.D. degree or its equivalent. Each applicant for this fellowship is required to submit a statement of his training and experience, a transcript of his college or university record, letters of recommendation from persons associated with the conservation movement in specific capacities, an outline of the graduate program of studies proposed, an outline of the research project to be undertaken for meeting the thesis requirements, and a letter of approval of both the applicant and his project from the major professor under whom the graduate program is proposed to be undertaken.

No. 5—Hugh Hammond Bennett Fieldwork Fellowships. A grant of not less than $5,000 to be awarded for one year to some outstanding young person with five or more years experience in field work in some conservation program who desires a year's leave to improve his knowledge of the particular field of conservation in which he is presently engaged or of some related field to which he hopes to be transferred. Each applicant for this fellowship is required to submit a statement of his training and experience, a transcript of his record from the last school, college or university attended, a letter of recommendation from his employer, letters of recommendation from persons associated with the conservation movement in specific field capacities, an outline of the program of work proposed to be undertaken for self improvement, and a letter of acceptance from the college, university or other agency in which he proposes to study.

No. 6—Research Fellowships. A grant of not less than $5,000 to be awarded for one year to some outstanding young person now engaged in research in some definite phase of conservation who desires a year's leave to undertake advanced studies along the lines of his research at some college, university or other research agency to the end that his research efficiency may be increased. Each applicant for this fellowship is required to submit a statement of his training and experience, a transcript of his college or university record, a list of his publications, a letter of recommendation from his employer, letters of recommendation from persons associated with the conservation movement in specific research capacities, an outline of the program of work proposed to be undertaken, a letter of acceptance from the college, university, or other research agency in which he proposes to study, and a letter of approval from the major professor or other research individual under whose direction he would be. In lieu of the above, this grant may be awarded to a university or college department of conservation to carry out an approved research project of definite value to conservation, for which other funds are not available.

No. 7—Special Reports. A grant of not more than $2,500 to cover part or all of the cost of publishing a committee report or a book or other special printed form, such as a pamphlet or bulletin, on a specific phase of conservation of which the author has special knowledge. It is assumed that the nature of the study to be reported on or the length of the report would be such that no publishing company would find it possible to undertake its publication without financial assistance or no journal could afford to give it the necessary space. Each applicant for this grant is required to submit the finished manuscript for study by a SCSA committee of his peers especially assigned to consider it, a letter of recommendation for its publication by some eminently qualified person identified with the special field of conservation covered by the manuscript, and a letter of acceptance of the manuscript from some publishing agency stating the specific reasons for the need for such financial assistance in its publication.

No. 8—Free Copies of Journal for Special Purposes. A grant of not less than $1,000 annually to the JOURNAL OF SOIL AND WATER CONSERVATION of the SCSA to permit free distribution of the Journal, and of the Society's other publications, to a selected list of members of soil conservation societies or other persons in foreign countries, notably those in greatest need of more conservation effort, and the placement of the Journal in a larger number of libraries in this country. The editor of the Journal is required to prepare a list of persons and agencies to which the Journal and other publications of the Society are to be sent free of cost and the reasons for their selection, this list to be revised annually.

No. 9—Travel Funds for Participating in International Affairs in Soil and Water Conservation. A grant of not more than $1,000 to the SCSA to pay the expenses of a member of the Society delegated to visit one or more foreign countries to study conservation practices, land use and related matters and report on them to the Society or of one or more members of the Society chosen to represent it at conferences of national and international scope in countries other than the United States and Canada. Each designee for such expenses is required to present a statement covering the nature of the work to be done or the meeting or meetings to be attended, the reasons why it is believed the Society will benefit by this, and the estimated costs.

No. 10—SCSA Awards. An award of $2,500, to be known as the Soil-Conservation-Society-of-America Award, to be given annually, or less frequently if no suitable nominee exists, to a person who, during the previous five years, has carried

out a program in some specific phase of conservation education, field work, research or agricultural practice that, by reason of its special effectiveness, justifies this type and degree of recognition by the Society. The person or group of persons recommending an individual for such an award are required to submit a statement outlining the reasons for the award, this statement to contain a record of the nominee's training and experience, a comprehensive review of the specific piece of work for which the award is recommended, and an indication of the importance and value of this work to the conservation effort.

REPORT OF COMMITTEE ON PUBLIC POLICY

During 1958 the President of the Soil Conservation Society of America appointed a Committee on Public Policy.

Any statement of the Society on public policy, to represent the membership, needs to be carefully studied, broad in its scope, and meaningful in content. The statement, as read at the 14th annual meeting, had been submitted to the Chapters for review and comments. The statement is broad and constitutes a foundation on which further public policy of the Society can be formulated.

Here is the report of the Committee as read by Firman E. Bear, August 26, 1959, during the annual meeting held at Rapid City, South Dakota. Comments from SCSA members are solicited.

The aim of the Soil Conservation Society of America is to further the cause of good land and water use to the end that these and the other related renewable natural resources—crops, grasslands, forests, livestock, fish, and wildlife—are conserved, used and reused ever more effectively by man in perpetuity. The public policies of the Society in relation to this aim are:

1. Since all the people share in the benefits derived from the conservation, sound development and use of all our renewable natural resources, they all have obligations in connection therewith. It is the policy of the Society to encourage full participation of all the people—individually and collectively through private and public organizations and agencies—in the planning, financing and operating of such activities as offer the greatest promise of lasting benefits from these resources.

2. Since there is great need that all the people have a better understanding of the problems involved in the conservation, sound development and use of all our renewable natural resources, greater provision should be made for adequate education in these fields of study. It is the policy of the Society to encourage the development of courses of instruction covering the various aspects of the management of these resources in institutions of learning, and to stimulate the acquiring of more and better information on these resources by social and civic organizations, youth groups, newspaper and journal staffs, and individual leaders in all walks of life.

3. Since new and more specific and exact information is needed concerning the solution of the more difficult problems in the conservation, sound development and use of renewable natural resources, it is necessary that we have the benefit of continued research in the several phases of this broad area of effort. It is the policy of the Society to encourage scientific research that will add to our knowledge of how to manage these resources and that will increase the efficiency of the technicians, landowners, and land managers engaged in applying such research findings to field practice.

4. Since our population is growing, our economy is expanding, our people are becoming increasingly mobile, our needs for national defense are enlarging and, as a result, our competition for land and water resources is growing, it becomes increasingly necessary that careful consideration be given to any new uses to which these basic natural resources are to be put. It is the policy of the Society to encourage full consideration of the several needs for land and water to the end that unnecessary waste is avoided and the greatest good is derived for the greatest number of people from each unit of these resources.

5. Since our economy is highly dynamic, and great difficulty is being experienced in anticipating the direction and extent of our economic growth and of the needs arising therefrom, it is necessary that measures employed for the conservation, sound development and use of all our renewable natural resources be continuously adjusted as required to meet the changing needs. It is the policy of the Society to review annually its own concepts about these resources to the end that those which are inadequate are abandoned and new ones that are more in keeping with known and expected needs are developed to replace them.

6. Since experience has shown that the most effective means of dealing with the problems of conservation, sound development and use of our land and water resources is by way of the entire area of a given unit of management—farm, ranch, or other privately or publicly owned acreage—it is desirable that this approach be employed as far as possible. It is the policy of the Society to encourage consideration of the entire area of land in a given ownership, management, watershed, or other suitable unit, in carrying out the conservation, development and use practices required for best results.

7. Since it is the aim in every well-conceived watershed-development program to serve the interests of all the people having a stake in the watershed, all these people, operating as individuals or as groups, should participate in planning and financing it and in carrying it out. It is the policy of the Society to encourage such participation by all the people to the end that both costs and benefits are distributed equitably among the individual landowners and the public at large.—R. Y. BAILEY, FIRMAN E. BEAR, R. K. BLISS, J. S. RUSSELL, and LLOYD E. PARTAIN, *Chairman*.

CHAPTER DELEGATES' BUZZ SESSIONS PROVE POPULAR AT RAPID CITY

Buzz sessions were engaged in by representatives attending the special chapters delegate session during the 14th annual meeting of SCSA at Rapid City. Buzz session topics and leaders were: (1) "Special activities for chapters", John R. J. Bradshaw, Utah (leader) and Melvin R. Blish, Pa. (recorder); (2) "The chapter delegate session", Minott Silliman, Ill. (leader) and Wm. Briggs, Ind. (recorder); (3) "Chapter handbooks", Russell G. Hill, Mich. (leader) and A. Klingehoetz, Wis. (recorder); (4) "Financing the local chapter and its activities", A. H. Veazey, N. C. (leader) and J. W. Fitts, N. C. (recorder); (5) "Chapter activities contest", H. A. Hopper, Calif. (leader) and Win Harrison, Mich. (recorder); (6) "Membership", John W. Barnard, Washington, D. C. (leader) and E. V. Wickline, W. Va. (recorder).

Present at the chapters delegate session were 116 delegates representing 73 chapters. Each buzz session had about 35 minutes to settle down and cover its topic. There was almost universal participation by delegates assigned to the buzz sessions. Reports of the sessions have been mimeographed and sent to each of the chapters and delegates.

Overall chairman of the chapters delegate session was I. O. Hembre of Madison, Wis.

NEWLY ELECTED OFFICERS AND COUNCIL MEMBERS

Serving the Society in 1960 are, left to right: R. D. Hockensmith, 2nd vice-president; W. C. Gumbel, 1st vice-president; E. L. Sauer, president; H. F. Barrows, treasurer; and B. K. Geraghty, council.

Elmer L. Sauer of Champaign, Illinois, research liaison representative of the Soil Conservation Service, USDA, for the cornbelt states, was elected as the next president of the Soil Conservation Society of America. Newly elected officers and council members take office January 1, 1960.

Sauer, holder of a Ph.D. degree in agricultural economics, University of Illinois, is a charter member and a Fellow of the Society. He has served on many committees and is presently the first vice-president of the Society. For a number of years he was chairman of the editorial board of the JOURNAL OF SOIL AND WATER CONSERVATION. He is author of many technical articles, especially on the economics of conservation.

Walter C. Gumbel, conservationist for the Monongahela Power Company, Fairmont, W. Va., was elected first vice-president.

Gumbel is currently serving as second vice-president of the Society and has served on many committees and is a Fellow. He was the first editor of the Society's JOURNAL from 1945 to 1956.

His work in West Virginia involves promoting, developing, and coordinating conservation among agricultural, industrial and urban groups. From 1943 to 1946, he was state conservationist for the Soil Conservation Service in Pennsylvania.

Roy D. Hockensmith, director since 1952 of soil survey operations for the Soil Conservation Service, Washington, D. C., was elected second vice-president.

Hockensmith has been active on many committees in the Society for a number of years and is a charter member. In 1957 he was elevated to the rank of Fellow, which is the highest honor awarded to individual members in the Society. He is author of several articles for the JOURNAL.

Howard F. Barrows, of St. Augustine, Florida, was re-elected treasurer. He was formerly associated with Austin-Western Works, Aurora, Illinois, and got industries, contractors and engineers to enter soil and water conservation business. He is now retired and resides in Florida.

Barrows has served on many various committees of the Society and has been treasurer since 1956.

Bernard K. Geraghty, area conservationist, Soil Conservation Service, Manhattan, Kansas, was elected council member for the Great Plains region of the Society. He succeeds H. G. Bobst.

Geraghty has been active in the SCSA, having served as a chairman of the Manhattan chapter in Kansas. He is a charter member of the Society and has served on the chapter activities committee. Currently he is secretary-treasurer of the Kansas Council of SCSA Chapters.

Willis J. Huddleston, professor of Agronomy and chairman of the Department of Agronomy, Tennessee Polytechnic Institute, Cookeville, Tenn., was elected council member of the Southeastern region. He follows A. H. Veazey.

Huddleston is a graduate of Tennessee Polytechnic Institute and holds a M.S. degree from Peabody College with graduate work at Iowa State College and Mississippi State University. Under his guidance, more than 60 soil conservationists have received training. He has also trained winning teams and high individual scorers in the Southeastern collegiate soil judging contest. He was state chairman of the Goodyear soil conservation awards contest for three years.

He is a charter member and first chairman of the Andrew Jackson chapter in Tennessee, and served as its delegate to the SCSA 13th annual meeting held at Asheville, N. C., in 1958.

Austin L. Patrick, who until his retirement recently was a field representative of the Soil Conservation Service, USDA, Washington, D. C., was elected as a council member at large to fill the position currently held by E. D. Bolton.

Patrick is a founder and charter member of the SCSA. He served as its first vice-president, and later as an officer or council member for nine years. He was elected president in 1955 and became a Fellow in 1952.

Patrick has participated in all phases of the Society's activities, and is a member of the Washington, D. C., No. 1 chapter.

Retiring council members are **H. G. Bobst, E. D. Bolton,** and **A. H. Veazey.** Each of these has served faithfully and was so honored by suitable plaques and accolades during the closing banquet session at Rapid City. **A. C. Watson,** retiring president, will continue to serve on the council ex-officio during 1960.

—SCSA—

SCSA BOOKLET DISTRIBUTED

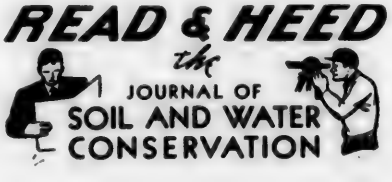
The Northern Illinois chapter, sweepstakes winner in the Chapter Activities Contest of 1959, reached one of its goals—the placement of a copy of SCSA booklet **Down the River** in every rural home in Champaign County.

An outline of the Illinois procedure, which will also work well with **The Wonder of Water, The Story of Land,** and **Dennis the Menace and Dirt,** has been sent by Secretary Pritchard to all chapters.

—SCSA—

JOURNAL ARTICLE REPRINTED

"Conservation Reserve Program" by James K. Vessey (March 1958 JOURNAL) has been reprinted in *World Agriculture*, January, 1959.



SCSA FINANCIAL STATEMENT

The Society's fiscal year is now from July 1 to June 30 following, inclusive. This is in accordance with the Bylaws, Art. IX, Sect. 5.

An accrual basis of accounting has been set up to account for receivables, payables, inventories, and supplies.

All of this indicates a maturity of the Society, with its business and financial aspects under audit of certified public accountants.

Following is a portion of the financial statements for the six months ending June 30, 1959, as prepared by Peat, Marwick, Mitchell & Co., Certified Public Accountants.

A mimeographed copy of the complete audit for the first six months of 1959 can be obtained on request by writing the Executive Secretary, SCSA, 838 Fifth Ave., Des Moines 14, Iowa.

Soil Conservation Society of America, Incorporated

Statement of Financial Condition
June 30, 1959

ASSETS

Current assets		
Cash on hand and in banks		
Treasurer's account	$10,443.03	
Savings account	9,370.50	
Secretary's account	422.84	
Petty cash	20.00	$20,256.37
Accounts receivable		3,662.43
Inventory—booklets and emblems, at cost		5,658.41
Prepaid expenses		
Office supplies	1,561.92	
Pension trust agreement	1,037.43	
Unexpired insurance	236.90	
Other	80.81	2,917.06
Accrued interest income		21.61
Total current assets		32,515.88
Development fund		384.57
Treasury bonds and notes, at cost or amortized cost		14,945.65
Office equipment	9,942.06	
Less allowance for depreciation	4,071.28	5,870.78
Deposit with United Air Lines		425.00
		$54,141.88

LIABILITIES

Current liabilities		
Accounts payable		$ 313.44
Chapter booklet commissions payable		768.23
Withholding tax deduction		316.00
Chapter dues refundable		15.00
Accrued payroll taxes		118.29
Total current liabilities		1,530.96
Deferred membership dues		576.70
Reserve for Development Fund		384.57
Membership equity		
Balance at January 1, 1959	$38,639.06	
Net earnings for six months ended June 30, 1959	13,010.79	51,649.85
		$54,141.88

Statement of Earnings
Six months ended June 30, 1959

Operating income		
Dues		$37,445.54
Journal		5,180.50
Gross profit on booklet and emblem sales		4,663.40
Sale of chapter office supplies		682.53
Total operating income		$47,971.97
Operating expenses		
Executive secretary's office	$20,075.05	
Journal	12,788.83	
Other	2,418.43	35,282.31
Operating profit		12,689.66
Other income		
Interest on bonds and notes	188.15	
Interest on savings account	121.31	
Miscellaneous	11.67	321.13
Net earnings		$13,010.79

HUGH HAMMOND BENNETT COIN

Registrants at the 14th annual meeting at Rapid City were provided with a special coin honoring Hugh Hammond Bennett.

On one side of the coin is a likeness of Dr. Bennett and on the other side is the emblem of the Soil Conservation Society of America. The Council of the Society thought that in conjunction with the special soil conservation stamp issued in Rapid City, it would be most appropriate to honor Dr. Bennett with the coin. A special embedment was presented to Dr. Bennett at the meeting and his response was one of the highlights.

Already coin collectors from throughout the world are asking for a coin as information about it was carried in several coin collector's magazines.

Several questions have reached me about this coin. Here are the answers to those most frequently asked:

●Twelve hundred coins were struck and it is now planned that 1,000 additional coins will be ordered. Coin collectors advise that a limited number will make the coin more valuable.

●Any registrant at the 14th annual meeting who failed to receive a coin will be sent one free upon receipt of his written request. (We cannot supply free coins for your friends or replace one that is now discolored.)

●If your coin is discolored you may wish to order a new one and have it immediately placed in plastic. Cost of plastic cover and new coin is $2.25.

●A special plastic case, together with a new coin, and two of the soil conservation commemorative stamps can also be secured from Society headquarters for $2.75. This combination makes up a very attractive desk piece.

●Coins will be sold to Society members or to coin collectors at $1.00 each, prepaid.

●Chapters desiring to order coins for distribution at chapter meetings, either as "give away" items or for sale, may order them in bulk (minimum is 10) for 50c each.

The Hugh Hammond Bennett coin was struck in honor of a world-famous soil conservationist and a founder of the SCSA. Mounted in protective plastic cover, this coin already has high collectors' value. Dr. Bennett's response, after he had been presented with a special mounting of the coin, was a fine memorable part of the 1959 annual meeting at Rapid City.

To the Editor:

Having been deep in public relations for human betterment for nearly 70 years, I examined your [SCSA printed materials] with a critical eye. May this veteran comment you are doing profoundly worthwhile work.

"The "Dennis the Menace and Dirt" pamphlet seems especially effective in the changed conditions of today.

C. M. GOETHE
Sacramento, Calif.

* * *

I have [read] the September issue of the [JOURNAL] and hasten to congratulate you upon getting together such a valuable and interesting number. Both the articles and the reviews strike me as exceptionally good.

PAUL B. SEARS
Yale University
Conservation Program
New Haven, Conn.

Fellows Elected in 1959

STANLEY W. COSBY, *Berkeley, Calif.* Now is deputy state conservationist, California State Office of the USDA, Soil Conservation Service.

Cosby, through education, experience and ability has displayed outstanding leadership in many soil and water conservation programs now in effect in five Western states, Alaska and Hawaii.

Cosby is a charter member of the Society and has been a consistent and effective supporter of its objectives. He has written many significant publications in the soil field.

HERBERT A. HOPPER, *Lafayette, Calif.* A field representative of the California Soil Conservation Commission and the Division of Soil Conservation since 1950.

Hopper formerly served as a soil scientist with the Soil Conservation Service. He is a native of New York state and a graduate of Cornell University.

He has been Western Region council member of the SCSA since 1956, and has served as chairman of the Awards Committee of the Society since 1954. He was active in participating as a host for the 12th annual meeting and is a charter and sustaining member of the Society.

R. NEIL IRVING, *Hayden Lake, Idaho.* Until his retirement in 1959, Irving served as state conservationist of the Soil Conservation Service in Idaho for over 20 years and was an advisory member of the State Soil Conservation Commission.

During his leadership in Idaho he attained wide acquaintanceship traveling through all parts of the state. He is known by countless 4-H girls and boys with whom he worked when he was employed by the Extension Service. He is a graduate of the University of Idaho, class of 1921.

He has been active in the SCSA and is a charter member. In 1955 and 1956 he assisted in organizing the Idaho chapter.

L. L. LOUGH, *Morgantown, W. Va.* Since 1934, Lough has served in a number of positions of leadership in the Soil Conservation Service, ranging from project manager to his current position as state conservationist of West Virginia which he assumed in 1942.

Lough graduated from West Virgina University with a B.S. degree in agriculture and was initially employed by the Extension Service as a county agent.

A charter member of the Society, he has been active in the West Virginia chapter since it was first organized and was chairman in 1957.

Lough demonstrated exceptional leadership in promoting watershed protection and flood prevention activities, particularly through the "pilot watershed" at Salem, W. Va. This watershed was recognized in 1959 by the National Watershed Congress as one of the outstanding projects of its type in the nation.

Assistance in the formation of the West Virginia Conservation Education Council in 1958 may be cited as another example of his leadership.

H. WAYNE PRITCHARD, *Des Moines, Iowa.* During his term as executive secretary, the SCSA has made many advances internationally and nationally, attaining a membership of over 10,000 in some 72 countries and all the states.

Prior to being employed by the Society, Pritchard served as executive secretary of the Iowa state soil conservation committee and taught vocational agriculture in several Iowa communities. He received his bachelor degree at the Iowa State University.

He is a member of the Iowa chapter. He has been active on various agriculture and conservation committees of the Des Moines Chamber of Commerce and the Kiwanis, and the advisory committee of the Goodyear SCD award program.

RUSSELL S. STAUFFER, *Urbana, Ill.* Stauffer is associated with the Department of Agronomy at the University of Illinois, where he received his Ph.D. degree in 1933. He recently retired from active teaching.

At the University of Illinois he is widely known for the excellence of his teaching. He was an advisor to many graduate students, a number of which have entered soil and water conservation work.

Stauffer has promoted and planned land judging contests for University of Illinois students.

He has conducted tours for students to a number of local farms which have established basic conservation plans. He is active in the affairs of the Northern Illinois chapter.

WENDELL R. TASCHER, *Washington, D. C.* Tascher is associated with the Extension Service, Washington, D. C. He received an appointment as extension soil conservationist in a cooperative position in the USDA in 1942, assuming his present position as project leader of extension and soil conservation work in the U. S. and territories in 1954.

He has been active in the affairs of the Society and the Washington, D. C. No. 1 chapter. In 1958 received one of the first President's Citations.

Tascher owns a farm in Illinois and has traveled extensively throughout the world and made special studies in plant genetics. He received his Ph.D. degree from the University of Missouri in 1929. He has been an active member of the advisory committee to the Goodyear Tire and Rubber Company's soil conservation district awards program since its inception more than 10 years ago. He has been an advisor to the committee on national land, pasture, and range judging contests since the beginning of this work in Oklahoma. He has authored and co-authored a number of articles, one of which won a JOURNAL award for 1957.

Honorary Members

OSCAR CAMP, *Spokane, Washington.* Camp, an SCSA member, has long been active in soil conservation work. He became a supervisor in the West Whitman soil conservation district in 1948 and since then has participated in district affairs on local, state, and national levels. He served as president of the area association in 1952, became vice-president of the Washington State Association of Soil Conservation Districts in 1952 and 1953, and served as its president from 1954 to 1956. He was a member of the Washington State College Agronomy board and is now on the state Soil Conservation Committee.

CARL HAYDEN, *Tempe, Arizona.* The Honorable Carl Hayden, United States Senator from Arizona, has been concerned with resource conservation for many years.

In Arizona he is widely known as "Mr. Conservation." He has led in the movement to get Arizona to study its water resources. As a result, the Arizona Water Resource Committee has been established and there is a large-scale practical experimentation on watersheds now underway, with many agencies, public and private, participating.

Carl Hayden has nationally played a role in forestry, reclamation and soil and moisture conservation legislation, particularly active along these lines in his work as a member of the Senate appropriations committee.

EDWARD I. KOTOK, *Walnut Creek, Calif.* Recently retired from active work in the USDA Forest Service, Kotok has been a devotee of research in the fields of forestry, fire protection, flood control, range and other land management problems.

He is a veteran conservationist, having first identified himself with the movement in 1909 under the top leadership of Gifford Pinchot in the Forest Service. He is known internationally for his leadership in research work and development of policies and technical information.

He has served as a vice-president of the Society of American Foresters and is a Fellow in the Geographical Society.

As a member of SCSA, he has served on various committees and as a councilmember of the former San Francisco Bay chapter. He continues to devote much time and effort to conservation problems.

HERBERT H. PLAMBECK, *Des Moines, Iowa.* Farm director of radio station WHO in Des Moines, Iowa, since 1936, Plambeck has made many notable contributions to soil and water conservation. Through his initiative, the annual national conservation field days and plowing matches have attracted many thousands of people and brought soil and water conservation efforts to the attention of political leaders.

In 1955 he toured Soviet Russia and led a large group of Midwesterners. An article entitled "Land Uses in Russia" was published in the March, 1956, JOURNAL.

WILLIAM E. RICHARDS, *Orleans, Nebr.* President of the National Association of Soil Conservation Districts, Richards is recognized as one of the nation's leaders in resource development. He is also presently chairman of the Nebraska State Soil and Water Conservation Committee and immediate past president of the Nebraska Association of Soil and Water Conservation Districts.

He owns and operates a ranch in Harlan County, Nebraska, the original homestead of his maternal grandparents. He is a graduate of Kearney State College, and studied law at the University of Nebraska.

—SCSA—

PRESIDENT'S CITATIONS 1959

The President's Citation is an honor conveyed to no more than ten individuals each year in recognition of their unusual and extraordinary activities that have been of particular significance regionally or more to the Society. Each recipient receives during the annual meeting from the President a framed certificate stating the citation and signed by the President.

Selection for this honor is made by the President, and may be made from those approved by the Awards Committee for a Commendation Award or from others known to him.

Those who received the President's Citation in 1959 and were so recognized at the Rapid City meeting are:

Jack L. Barrick, Burlington, Vt.; **Norman A. Berg,** Huron, S. Dak.; **H. Gerald Bobst,** Washington, D. C.; **Hank Ketcham,** Carmel Valley, Calif.; **John T. Loucks,** Rapid City, S. Dak.; **Sanford Martin,** Washington, D. C.; **Sterling D. Mummert,** Carmel Valley, Calif.; **Harold M. Rhodes,** Morgantown, W. Va.; **Frank W. Schaller,** Ames, Iowa; **D. Harper Simms,** Washington, D. C.

"If the beast who sleeps in man could be held down by threats—any kind of threats, whether of jail or of retribution after death—then the highest emblem of humanity would be the lion tamer in the circus with his whip, not the prophet who sacrificed himself. But don't you see, this is just the point—what has for centuries raised men above the beast is not the cudgel but an inward music, the irresistible power of unarmed truth, the powerful attraction of its example." **(Boris Pasternak.)**

COMMENDATIONS 1959

Those receiving a letter of commendation signed by the President for 1959, and were so recognized during the annual meeting at Rapid City, are:

Sven G. Anderson, Sacramento, Calif.; **William H. Berry,** Washington, D. C.; **Bernard L. Clausen,** Ann Arbor, Mich.; **C. Douglas Hole,** Boise, Idaho; **Lawrence M. Hollingsworth,** Gainesville, Fla.; **Harvey N. Kelly,** Salisbury, N. C.; **Charles A. Logan,** Beltsville, Md.; **Esther P. Perry,** Berkeley, Calif.; **Thomas H. Pozarnsky,** Mission, S. Dak.; **Roger E. Sherman,** Elsberry, Mo.; **W. E. Silverwood,** Redlands, Calif.; **Warren A. Starr,** Pullman, Wash.

JOURNAL AUTHORS HONORED

Three authors were honored by the Soil Conservation Society of America during its 14th annual meeting.

Each year the Society members have an opportunity to vote on and select three articles which appeared in the JOURNAL OF SOIL AND WATER CONSERVATION in the year previous to the balloting. The authors and papers which received top recognition this past year are: Don A. Williams, "Tomorrow's Professional Conservationist;" Charles R. Patton, "Biltmore Estate—Cradle of Conservation in America;" and Ray Walker, "Effects of 1957 Storms on Oklahoma Watersheds."

Don A. Williams is administrator of the Soil Conservation Service, USDA, Washington, D. C.

C. R. Patton is area conservationist, Soil Conservation Service, at Johnson City, Tenn. When he prepared the "Biltmore Estate" article, he was work unit conservationist at Asheville, N. C., and chairman of the SCSA annual meeting local arrangements committee.

Ray Walker is state conservationist, Soil Conservation Service, with headquarters at Stillwater, Oklahoma.

MERIT AWARDS INSTITUTED

Certificates of Merit were presented for the first time by the SCSA during its annual meeting at Rapid City in recognition of the book, **Rocks and Rain and the Rays of the Sun** by William Fox, (1958: Henry Z. Walck, Inc., 101 Fifth Ave., New York 3, N. Y. $3.00), and the exhibit, **Rainfall in Action.**

William Fox is a charter member of the SCSA and is employed by the Soil Conservation Service, California State Office in Berkeley. The writing of the book was a personal project inspired by a shortage of conservation materials for the fourth grade.

The exhibit, Rainfall in Action, has been viewed by about one million people since it was constructed in 1957 by Harlie Larson, extension soil conservation agent, Caledonia, Minn., and financed by the Root River soil conservation district. SCSA members viewed it at the 1958 annual meeting in Asheville, N. C.

The intent of the Merit Award is to call attention to outstanding "products" of individual or group effort that brings added knowledge and appreciation of the "arts and sciences of good land use," Chapters and individuals will have an opportunity to make 1960 nominations for this award.

CHAPTER ACTIVITIES CONTEST WINNERS

There were 28 entries in the 1959 Chapter Activities Contest: 3 in the Western region; 6 in the Great Plains; 7 in the North Central region; 8 in the Northeast region, and 4 in the Southeast region.

Regional winners were: (Western) California; (Great Plains) South Dakota; (North Central) Northern Illinois; (Northeast) Washington, D. C. No. 1; (Southeast) North Carolina; and (Student chapters) Rutgers University.

The sweepstakes winner (Society-wide) was the Northern Illinois chapter.

Descriptions of the activities of the regional winning chapters and the sweepstakes winner have been sent to all SCSA chapters.

—SCSA—

A CONSERVATION PACKET FOR SCHOOL LIBRARIES

Have you considered the use of the Soil Conservation Society of America publications (see appended list) made up into a packet for presentation to school libraries? The eight publications, properly housed and labeled in an attractive box or container, should prove acceptable to school libraries — especially on an upper elementary and high school level.

To round out this special conservation library, a subscription to the JOURNAL OF SOIL AND WATER CONSERVATION should be arranged. A number of subscriptions to high school or vocational agriculture libraries are now supplied by Soil Conservation Districts.

Have you checked with the colleges and universities in your state to see if they now subscribe to the JOURNAL? There is a very real possibility of obtaining more than a thousand new subscriptions through college and university libraries in the U.S.A. and Canada.

SCSA Publications Available[1]

JOURNAL OF SOIL AND WATER CONSERVATION—Official publication of the Society. Bi-monthly. Secured through membership, $5.00 annually; subscriptions to agencies, firms, and institutions, $5.00 annually.

Glossary—Published in 1952 after 5 years of work by a special committee. Contains 900 terms. Price $1.00 per copy.

Our Watershed Resource—A series of six articles with emphasis on watersheds. Single copies 50c, 10 copies $4.50, 25 copies $10.00, 50 copies $15.00, 100 copies $25.00. Write for special prices on larger quantities.

Land Utilization in the United States—A series of six papers dealing with modern problems of land use, with emphasis on urbanization. Prices are same as those of "Our Watershed Resource".

The Story of Land—Four-colors, cartoon-style. 20c; 100 copies $7.50; 1,000 copies $45.00; 10,000 copies $400.00. Imprinting charge $4.50 per thousand. Also published in a Spanish edition.

The Wonder of Water—Four-color cartoon-style, easy-to-read. Back page may carry imprint of sponsor's message. Prices same as for "The Story of Land." Imprinting charge is extra.

Suggestions to Teachers—An 8-page guide for teachers grades 6 through 12, using the booklet, "The Wonder of Water." One copy 25c; 5-10, 20c; over 10, 15c each.

Down the River—The story of loss of rich topsoil. 1-99 copies 10 each; 100-999 copies 9c each; 1,000-9,999 copies 8½c each; 10,000-24,999 copies 8c each; 25,000 and over 7½ each.

Dennis the Menace and Dirt—Cartoon-style, four-color easy-to-read booklet. 1-9 copies 20c each; 10-999 copies 10c each; 100-499 copies 8c each; 500-999 copies 7c each; 1,000-9,999 copies 6c each; 10,000-24,999 copies 5½c each; 25,000-99,999 copies 4½c each; 100,000 or more copies are 3½c each. Small space for imprinting by sponsor on back page.

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[1] *An attractive brochure describing the SCSA publications is available free by writing Soil Conservation Society of America, 838 Fifth Avenue, Des Moines 14, Iowa.*

SUGGESTIONS TO AUTHORS

Of Manuscripts for the Journal of Soil and Water Conservation

BOTH members and nonmembers of the Soil Conservation Society of America are invited to submit articles.

Prospective authors should examine recent issues of the Journal to familiarize themselves with the types of articles used. Questions concerning editorial matters and preparation of manuscripts should be directed to the Editor, 838 Fifth Avenue, Des Moines 14, Iowa.

Objectives of the Journal

The Journal of Soil and Water Conservation is the official publication of the Soil Conservation Society of America. It is a technical and professional journal, as distinguished from a strictly scientific publication on the one hand and an educational or popular magazine on the other. It is dedicated to promoting the objectives and philosophy of the Society as stated in the By-laws:

> *"The objectives of this Society shall be the development and advancement of the science and art of good land use and management and the promotion of conservation of soil, water, and related renewable resources, including, without limitation, trees, grass, fish, wildlife, and other forms of beneficial plant and animal life, and for these purposes to employ education of the people and other appropriate means, to the end that mankind may have the use and enjoyment of these resources forever."*

New information about any aspect of good land use and conservation or about techniques and methods of accomplishing the Society's objectives is appropriate.

A more complete statement of the Journal's objectives and the kinds of material to be published will be found in the "Editorial Guidelines."

Types of Articles

Briefly, the Journal seeks three types of contributions:

● *Technical papers and general articles.* The major articles of the Journal should be authoritative and comprehensive papers that help to "advance the frontiers of the science and art of good land use." They may deal with conservation technology, philosophy, or policy. They may be based on recent research results, field observations, or experience in the specific field of land use and conservation, or they may adapt and apply information from other specialized fields.

● *Technical notes.* The Journal uses short articles describing new or improved techniques and field practices, new programs and activities, new equipment and teaching materials, and other "tools of the trade" that will be useful to practicing conservationists.

● *News notes and comments.* News of current developments in the conservation field, meetings, reviews and listings of new books and publications, and reports and discussion of Society affairs are used in the special sections of the Journal.

Review and Acceptance of Manuscripts

Manuscripts will be judged on the basis of their subject matter content and literary excellence and the degree to which they meet the objectives and standards set forth in the "Editorial Guidelines."

All major articles and most of the shorter technical articles are reviewed by the editorial board. Nevertheless, the author, not the Journal, is responsible for the accuracy and validity of his statements.

It is the usual practice of the Journal not to accept papers that have been published elsewhere. There are exceptions and each case is individually considered. If a paper has been offered elsewhere for publication, this information should be made known to the editor of the Journal.

Some agencies and organizations require official clearance of manuscripts. It will be assumed that such clearance, if required, has been obtained for any manuscript submitted in final draft.

Style of Writing

The Journal seeks articles written in a clear, expository style, suitable to the subject matter in each case. Every article should be readily understood by readers not trained in the writer's technical specialty.

To this end, use familiar terms and expressions and make statements as concise as possible. Explain highly technical or unusual terms that are necessary to effective and accurate expression.

For definitions of special terms in the field of soil and water conservation the Journal uses the *Soil and Water Conservation Glossary* published by the Society (copies are available at cost). Otherwise, *Webster's New International Dictionary* is the standard guide to correct usage.

In matters of style, the Journal in general follows the *U. S. Government Printing Office Style Manual.*

Length of Articles

As a general rule a manuscript should not exceed 12 typewritten pages double-spaced on one side of letter-size paper. Ten pages of a typescript with one or two short tables and two or three figures make up about four pages in the Journal.

The Journal favors short articles. Omit lengthy field or test data and calculations which are not necessary to the understanding of the subject.

Keep footnotes to a minimum; where feasible, incorporate such material into the text at the proper place.

Organization of Article

Each article should follow a logical organization that effectively conveys the meaning to the reader. While the Journal does not require a stereotyped pattern, the presentation of technical information articles should be in a familiar form easy for the reader to grasp quickly. Greater variety is to be encouraged in other types of articles.

Often an interesting and effective presentation results from giving the conclusions or most significant message first, then filling in with the details. Or, a brief summary can be presented at the beginning of the article.

A paper should follow the normal rules of continuity with transitional sentences and paragraphs.

Use subheadings to aid in dividing the subject matter into logical parts and in emphasizing major points.

Technical articles should have a summary that states briefly and clearly any new significant information introduced.

Typing the Manuscript

Type the article on one side only of reasonably heavy white letter-size paper.

Use ample margins and leave the top fourth of the first page blank.

Number each page in the upper right hand corner.

Doublespace the *entire* manuscript, including quotations, figure captions, literature citations, and author's biographical information.

Type the main heading or title flush with the left margin, and in caps and lower case; do not underline. Keep the title short, explicit, and descriptive. A more complete description of the contents of the paper can be included in the introductory statement.

(continued on page 286)

Get full-rated capacity!

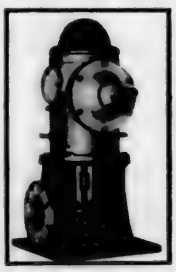
Fairbanks-Morse Pomona Turbine Pumps

Today's greatest irrigation pump value!

Whether you plan to pump with belt-drive, geared head or electric motor... you're sure of full-rated capacity at low operating cost with F-M Pomona Turbine Pumps!

As your field conditions change, you match pump capacity precisely and easily by adjusting the semi-open bronze impellers from ground level. This feature also permits compensation for eventual wear—important over the years. Initial installation and changing to other types of drive are greatly simplified.

For every type of irrigation—flood or sprinkler, from deep well or surface source—Fairbanks-Morse *proven quality* protects your pump investment. Contact your nearby F-M Pomona Pump Dealer today.



F-M Pomona Turbine Pumps are also available with geared-head or electric motor drive.

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a name worth remembering when you want the BEST

PUMPS • SCALES • ELECTRIC MOTORS • DIESEL, DUAL FUEL AND GAS ENGINES
LOCOMOTIVES • COMPRESSORS • GENERATORS • MAGNETOS • HOME WATER SYSTEMS

Type author's name in caps and flush to the right margin, two spaces below title.

Give biographical information about the author in a separate paragraph set apart by rule lines above and below. Include author's name, title, business connection, and address. Acknowledgements, personal or official references, and other similar statements can be placed here.

Type secondary headings or subheads in caps and lower case centered on separate lines, without periods or underlining.

Type each table on a separate sheet. Insert each table immediately after the page containing the first reference to it.

Put caption for figures on a separate sheet or sheets at the end of the manuscript.

References Cited

List references cited at the end of the text, in alphabetical order by authors, and number them serially. Indicate citations in the text by the appropriate number in parentheses.

Do not include unpublished items in the list of references, but identify them in the text or in footnotes. Footnotes, however, should be kept to a minimum.

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1. Chepil, W. S., N. P. Woodruff, and A. W. Zingg 1955. *Field Study of wind erosion in western Texas.* U.S. Dept. Agr., SCS-TP-125. Washington, D. C. 60 pp. illus.
2. McAlister, J. T. 1957. *Mulch farming gains favor in southeast.* Agr. Eng. 38(5): 312-315. May.
3. Neal, J. H. 1938. *The effect of the degree of slope and rainfall characteristics on runoff and soil erosion.* Mo. Agr. Expt. Sta. Res. Bul. 280. Columbia. 47 pp., illus.
4. Stallings, J. H. 1957. *Soil conservation.* Prentice-Hall, Inc., Englewood Cliffs, N. J. 575 pp., illus.

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Organize tables carefully and present them in the most concise manner possible.

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Use as few footnotes as practical. Use superior Arabic numerals to refer to footnotes.

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Submit illustrations unmounted and not interleaved with the text. Write the proper figure number and the author's name *lightly* with soft pencil on the back of each illustration. Do not write on the back of a photo or drawing with a ballpoint pen or typewriter, or stamp with an ink that shows through. Do not use paper clips on photos.

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(continued on page 288)

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After a manuscript is accepted for publication it is set in type and galley proofs are mailed to the author. Each author should have a carbon copy of his paper for reference in proof-reading. Instructions for handling proofs and ordering reprints are sent with the proofs.

Journal Production Schedule

The Journal is issued bi-monthly in January, March, May, July, September, and November. Copy goes to the printer not later than the 1st day of the month preceding publication.

The time required for processing a paper submitted for possible publication in the Journal varies. Generally it is 4 to 8 months from the time the editor first sees the manuscript for a major article until it appears in print. This interval depends partly on the amount of correspondence and work required to complete the review and necessary revision of the manuscript to make it acceptable to the Journal, and partly on the backlog of accepted manuscripts awaiting publication. ■

Reprints of "Editorial Guidelines" and "Suggestions to Authors" are available from the editorial office, 838 5th Ave., Des Moines 14, Iowa.

CHAPTER NEWS

California Chapter. With five sections now active, the California chapter can undertake programs in the San Francisco Bay, Fresno, Shasta-Lassen, Capitol (Sacramento), and the San Diego areas. It is expected the Antelope Valley section will be completely organized before too long.

Idaho Chapter. Sun Valley was the attractive site of the August 13 annual field trip and meeting. A conservation tour was held in the afternoon under the leadership of Floyd Dorius and J. Boyd Price. The members visited some of the early mining and agricultural areas in the Blaine soil conservation district. Many examples of irrigation were seen, although the principal agricultural enterprise is still livestock.

An excellent outline of the tour, including history and agricultural background, was prepared by the tour leaders.

J. C. Dykes, assistant administrator for field services, SCS, Washington, D. C., and H. Wayne Pritchard, executive secretary of SCSA, were the major speakers at the evening program. There were about 80 members and guests in attendance, with members from Washington, Colorado, Utah, Oregon and Washington, D. C., in attendance.

Egyptian Chapter (Illinois). The September 10 meeting was devoted to a tour of the demonstration farm established under the guidance of the chapter and the Southern Illinois University, from plans drawn by Charles Hufford, work unit conservationist. Items on the tour included land-use, farm ponds, improved pasture, hay lands, waterways and woodland planning and management. There were about 150 members and guests present at this meeting, with a large group of FFA students from several surrounding counties. The students are junior members of the chapter.

Northern Illinois Chapter. The annual meeting was held November 12 in the vicinity of Champaign-Urbana, with "Resource Development" the general theme divided between two panels. "Developing inventories and determining potential uses of soil, water and transportation resources around metropolitan areas" was the subject of one panel. Another panel explored "regional resource planning, including water supply, recreational needs and rural zoning." For the evening banquet Herbert B. Eagon, director of the Ohio Department of Natural Resources, was featured. A committee, headed by Mrs. Ernest Walker, planned a real treat for the ladies.

Like many other chapters throughout the country, a good many members took their families to Rapid City. Several families of the Northern Illinois chapter are now planning to attend the 15th annual meeting at Guelph, Ontario, with nearby Niagara Falls an added inducement to treat the wife to that honeymoon tour that never materialized. The newsletter makes sure that its members are aware of the date for the 15th annual meeting of SCSA at Guelph—August 28-31, 1960.

Further distribution of the SCSA booklet **Down the River** has been arranged in three counties, with 3,450 copies ordered.

Further work, through splendid cooperation from the Illinois Public Service Company, is going forward on a 60-acre tract adjoining the Kankakee State Park, for establishment of conservation practices. This Kankakee State Park project of the

(continued on page 290)

Test Yourself on Magnesium

Widespread shortages of magnesium are a fairly new problem in some parts of the United States. The shortage may now be beginning in your area. Be sure you can recognize it. These questions are designed to help bring you up-to-date.

1. Magnesium deficiencies usually show up in the leaves of the plant before serious damage has been done to the yield.
   True **False**
2. Magnesium deficiencies are most apparent in.....
   .....
   a. Root Structures **b. Leaves** **c. Stems**
3. Seed development often requires more magnesium than .....
   a. Nitrogen **b. Phosphorus** **c. Potassium**
4. Soil bacteria growth is stimulated by magnesium.
   True **False**
5. Magnesium availability in the soil is not affected by the amount of available calcium.
   True **False**
6. An application of magnesium limestone will not change the pH of the soil.
   True **False**
7. Yields are cut as a result of magnesium deficiencies because magnesium is a major element in seeds and fruit, and because magnesium acts as a carrier for another important element. That element is.....
   a. Phosphorus **b. Potassium** **c. Calcium**
8. Addition of high-analysis fertilizers containing sulfates, chlorides and nitrates helps to slow the loss of magnesium.
   True **False**
9. The greatest amount of magnesium is removed from the soil by leaching.
   True **False**
10. Water-soluble sulphate of potash-magnesia (Sul-Po-Mag) does not change the soil pH.
    True **False**

FOR THE CORRECT ANSWERS turn this ad upside down. If you answered 8 out of 10 questions correctly, chances are you are pretty well informed on the role magnesium plays in crop quantity and quality. If you had difficulty, you may be interested in sending for our booklet, "Magnesium."

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(Chapter News continued)

chapter is definitely growing and is probably one of the finest projects of its kind undertaken by a Society chapter.

Hoosier Chapter (Indiana). The fall field meeting was held in Perry County on October 23, with many families participating to view southern Indiana in full autumn color. The program centered around "Rural Development." L. Vogel, SCS work unit conservationist; H. E. Wallace, county agent; and county Rural Development chairman, Bob Cummings, discussed the meaning of Rural Development to Perry County, and eventually to other counties in Indiana.

The October newsletter shows that the chapter is starting organization in view of the 16th annual meeting of the Society to to be held at Purdue University in Indiana in 1961.

Iowa Chapter. The chapter now has four duplicate 50-slide sets with appropriate written scripts showing soil and water conservation activities in Iowa. The slide set was made by selecting from 600 slides submitted by members. The chapter now has members in every one of Iowa's 99 counties. Heavy use of the slide sets is promoted by members throughout Iowa, with the slides being used by farm, garden club, teacher and student groups.

The annual meeting of the chapter was held at Ames on October 23, with the theme of the program "Agricultural adjustment as related to soil and water conservation." Dean Floyd A. Andre, of Iowa State University, discussed "What is the agricultural adjustment center?"; Don Kaldor, professor of Economics at ISU, spoke on "The situation in respect to crop surpluses"; and John Pesek, professor of Soils, handled "Long time trends in crop yields." This was the morning program. In the afternoon, Alvin Bull, managing editor of *Wallaces Farmer*, talked on "What is needed in a farm program." He was followed by W. H. Allaway, assistant director of soil and water conservation research, USDA, Beltsville, Maryland, who discussed "The role of conservation in the time of surplus," and D. E. Wade on "Land and Recreation." For the dinner session, Dr. Allaway gave an illustrated lecture on Russia.

At the business meeting, presided over by President Charles Ballantyne, the chapter pledged $5,000 (to be paid over five years) toward the Building Fund of the Society.

Ft. Hays Chapter (Kansas). The last quarterly meeting of the year is scheduled on December 12 in Hays, Kansas. The chapter had four families attending the annual meeting at Rapid City. Larry Means, wildlife specialist at the Kirwin Dam, spoke at the third quarterly meeting. He showed slides and commented on progress being made on restoration of wildlife at the Dam.

Michigan Chapter. Regional meetings were held in September and October. Area 2 met at Cheboygan, Area 3 at Walters Gardens, Zeeland, and Area 4 at the Dow Chemical Co. in Midland.

The chapter has started its seventh year working with FFA chapters in soil and water conservation projects. The results of the first six years are imposing. Undoubtedly a printed copy of the brochure of this activity can be obtained by writing to the secretary of the Michigan chapter, SCSA, Room 412, Agricultural Hall, Michigan State Univ., East Lansing, Michigan. This brochure lists the achievement activities and reports for any FFA group taking part. There is a comprehensive list of activities and a list of 24 acceptable conservation practices which fit into the part entitled "Participation in planning and applying soil conservation practices." Many FFA members have learned much about soil and water conservation through active participation in this Michigan project.

North Carolina Chapter. The annual meeting of the chapter was held September 25 in Raleigh. One of the outstanding events of the meeting occurred during the banquet when Earl B. Garrett was presented a plaque from the chapter.

As a member of the SCSA since its organization, Garrett began his work in agriculture in the North Carolina Extension Service. In 1935 he joined the Soil Conservation Service and in 1937 became state coordinator of the SCS, with the title changing in 1942 to state conservationist. During the ceremony, L. Y. Ballentine, N. C. commissioner of agriculture, presented Garrett with two volumes of letters from friends expressing appreciation for his inspiration and leadership in the conservation movement. He and Mrs. Garrett were presented gifts as well, including a boat, trailer and outboard motor. Society member R. M. Dailey succeeds Garrett as North Carolina state conservationist.

E. B. Garrett, left, receives from President Joe Adair a memorial plaque presented by the SCSA North Carolina chapter.

All Ohio Chapter. The first summer meeting of the All Ohio chapter was held on August 14 at the Northwestern Substation, Castalia. A tour of trout production and management on the Levis farm near Castalia was followed by a chicken barbecue, business session and evening program. John W. Ferguson, chapter chairman, presided at the meeting.

Awards were presented to R. K. Davis for a paper entitled "Pesticides, Wildlife, Man" and W. H. Carmean for a paper entitled "Forest Soil Site Research in Southeastern Ohio." These papers were given at the All Ohio January 1959 chapter meeting.

To further encourage professional improvement within the chapter, an award will be made for the most outstanding

(continued on page 293)

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See Journal of Soil and Water Conservation, May '59, pgs. 117-119. "Jute for Waterways"; R. V. D. Broach, C. S. Slater, M. T. Augustine, and E. E. Evaul.

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article published during the year. The chapter also presented trophies to the winning team, the winning individual and the high individual of the overall Collegiate Land Judging Contest held on the Ohio State University campus in 1959.

Dr. Glen Schwab, in charge of drainage research at the substation in Castalia, discussed recent drainage research installation work underway. Seventy members and families attended the August meeting.

Oklahoma Council of SCSA Chapters. The 3rd annual meeting of the Council and the nine chapters in Oklahoma was held October 9 with the theme "Soil and water conservation education."

Presiding chairman was Dick Whessel of Foraker. Oliver S. Willham, president of Oklahoma State University, welcomed the chapter representatives and members. Each chapter represented had an opportunity to report briefly on activities. Dr. Horace Harper, of the Agronomy Department and a member of the Editorial Board of the JOURNAL, addressed the group on "How the Soil Conservation Society of America can be of service." Then followed two 15 minute talks on "What is available in Oklahoma regarding soil and water conservation education" by Clarence Bunch, representing farmers and 4-H, and Ralph Dressen, representing FFA.

Lewis E. Wolfe, state administrative officer in the state ASC, presided over a part of the afternon session.

"T-Bone" McDonald gave a vivid description of "Harnessing the horsepower for soil conservation education." An evening program followed the annual dinner and was presided over by Byrle Killian.

Heart of Texas Chapter (Texas) is to be chartered as one of the newest Society chapters in the very near future. On September 10, agricultural and soil and water conservationists from central Texas and vicinity met in an organization session and voted to apply for a charter. A petition with 54 names was received at the Des Moines office.

P. H. Walter is serving as temporary chairman and C. A. Rechenthin (P. O. Box 417, Temple, Texas) is serving as temporary secretary.

On hand to assist this group in establishing itself was E. D. Bolton, SCSA council member-at-large. Texas is on the move. This new chapter is a start toward establishment of several more chapters in the state.

Old Line (Maryland). A family picnic at Scott's Cove served as a kickoff meeting for "Maryland Land Week." The picnic was replete with an angling demonstration by Bernard Kreh and a display of forest fire-fighting equipment by the Department of Forest and Parks. The Governor's office was represented.

In the afternoon tours were taken to Rocky Gorge Dam. This dam was built by the Washington Suburban Sanitary Commission to store 6½ billion gallons of water for use in the Maryland suburban area. Another tour by bus visited the Maryland-Virginia Milk Producers Association, Mfg. Division, and gave members an opportunity to see one of the largest plants of its kind in the world in the processing of milk products. A third tour saw road bank seedings.

Southern New England Chapter (Connecticut, Massachusetts and Rhode Island). The October newsletter had a report of the summer meeting and many interesting remarks by John E. McCuen, chairman of the chapter. Chairman McCuen is coming up with some excellent ideas as to how individuals can participate actively in the affairs of the Society, as well as in a general way in conservation. The newsletter contains considerable information on individuals in the area.

West Virginia Chapter. At its annual meeting on September 26 and 27 the West Virginia chapter set a pattern for raising funds for the Society's building fund. At their business session the chapter pledged (as an organization) $600 for each of the next five years, starting in 1959, to the parent organization. This is over and above all annual dues.

The chapter members have formally accepted the obligation and have taken steps to raise the money in their own way and will send a check to the executive secretary of SCSA at the end of each year for $600. They decided that their proportionate share of the Fund was 3 per cent or $3,000, based solely on the number of members in the chapter in relation to the Society. There are actually less than 300 members.

Pledge cards were also passed out and members given an opportunity to pledge then and there. Between $700 and $800 was pledged and about $100 cash was paid. A Building Fund Committee will contact all members and solicit additional pledges. After pledges are in, the Committee will follow up on payments.

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A HOME FOR SCSA

WHY?

Since 1945 the Soil Conservation Society of America has been an increasingly important part of the soil conservation movement in America. Because of the vision and farsighted action of the founders of the Society, we have made progress and gained influence through organized effort. Hundreds of members have developed abilities and powers of leadership that might never have been used had it not been for the challenge received through the association with fellow members in chapters, meetings, on committees, and through membership.

Through its members the Society has already played a vital role in improving and raising the standards in soil conservation, in broadening the vision of the individuals of the profession, in strengthening the relationship with the public, and in developing greater unity within the profession. And the program of conservation on the land has been "speeded" through such action.

A Growing Society

The Soil Conservation Society of America in 1945 had 904 members. Today more than 10,000 are members and many others have at one time or another been affiliated with the organization. SCSA has gained an average of 53 members a month since the day it started. This consistent growth has added an increasing volume of work in the central office. As personnel have been added to meet this demand, more space has been required. New projects require additional storage and shipping facilities.

We, as a Society, are approaching a new phase of a career envied by similar groups. The Society has many accomplishments to its credit. It has proven to be a dynamic and forthright organization. What shall we make of the years ahead? All of us are looking with hope and optimism to what the future can bring. They can be great and wonderful years for the soil conservation movment if we strive to make them so.

Official Action

Unanimous action by the elected governing body of the Society—the Council—was to start work on a headquarters office building as soon as possible. This action was taken in late August at the 14th annual meeting, discussed with chapter officials and plans are moving ahead.

Three committees are working directly on the program. Firman E. Bear of New Brunswick, N. J., heads the Society's Development Fund Board, and it was this group that recommended the housing project be number one for the Society. A Housing Committee is chairmanned by J. S. Russell, of Des Moines, former president of the Society and farm editor of the Des Moines Register and Tribune. His committee is working on site selection, construction plans, etc. Harold M. Rhodes of Morgantown, West Virginia, and well known to Society members for his work on membership, will head the Building Fund Committee which will contact members and chapters.

Plans Thus Far Advanced

Not all decisions have been made but as indicated the office will be in Des Moines, Iowa, which is a central location in the Society membership. It is tentatively planned to locate the actual building within easy access of the two interstate highways to pass through the city, thus allowing members traveling through an opportunity to visit the headquarters.

Anticipated costs at present approximate $85,000 to $100,000 including land and a building designed to meet the needs of the Society for 25 to 40 years. It has been determined that such property used for the Society will be tax exempt. Rent now expended for the present inadequate quarters should easily cover maintenance and upkeep.

Finance Plan

The Council has directed that a large proportion of the money should be secured from the membership. Society dues have been low and because of this more people will be asked to become sustaining members for a period of five years at $20 a year over and above their regular dues. This would mean that in five years each such member would contribute $100 to the building fund as all sustaining money is to be used for this purpose until the building costs are met.

For members who cannot contribute a sustaining membership, if they will pay $2.00 a year for five years or a total of $10.00 they really would have paid their proportionate share. All payments are tax deductible.

It is hoped that many members will make their entire contribution the first year to allow officials to move ahead with preliminary plans.

Chapters to Pledge

Chapters will be asked to pledge a share of the Society needs for the building. Contributions by members within a chapter area will count toward the chapter quota and a record of such contributions will be available at the Society headquarters.

Personal contributions may be sent to the Society office at 838 Fifth Avenue, Des Moines, Iowa, or if you prefer, through your chapter treasurer. The chapter treasurer will forward your contribution to the central office.

We must have an average of $10.00 per member from 10,000 members if we reach our goal. Some will contribute less and some more than the average. You, personally, are asked to contribute to this fund according to your means. Widespread contributions are much desired because they are sure to bring with them the moral support that goes with widespread participation.

Will You Participate?

Each person who contributes "bricks" to the Society headquarters will forever feel that he had a part in stabilizing the organization and contributing to the soil conservation movement. It shall be "builded not only of stone, mortar, and the woods of the forest, but of the spirit of its founders and the devotion and loyalty of members."

BUILDING FUND PLEDGE

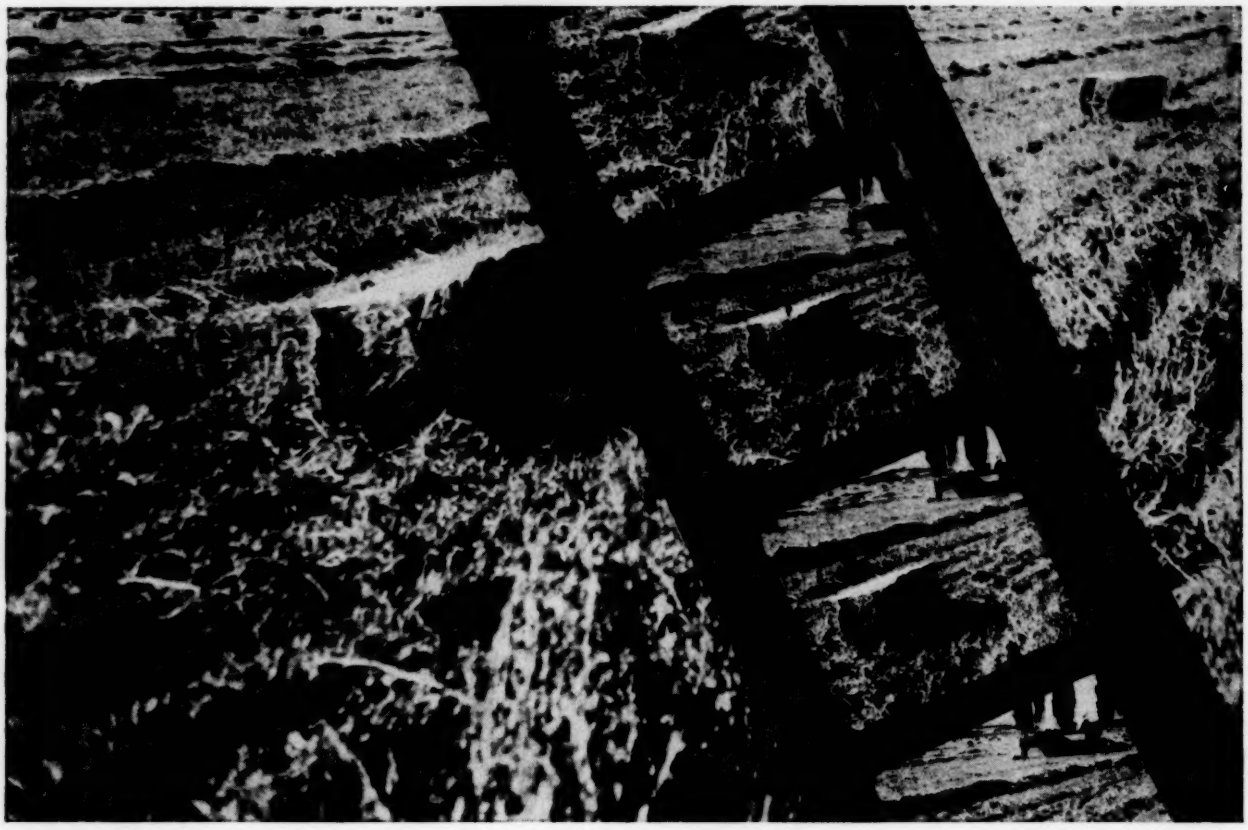
Date:_____

To: Treasurer_____ Chapter SCSA
or
Treasurer SCSA, 838 5th Ave., Des Moines, Iowa

I pledge:
A. $_____annually for the next five years.
B. $_____in a lump sum to be paid in_____(Year)

Chapter Affiliation:_____ Signed:_____

Address:_____



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